FIG. 1

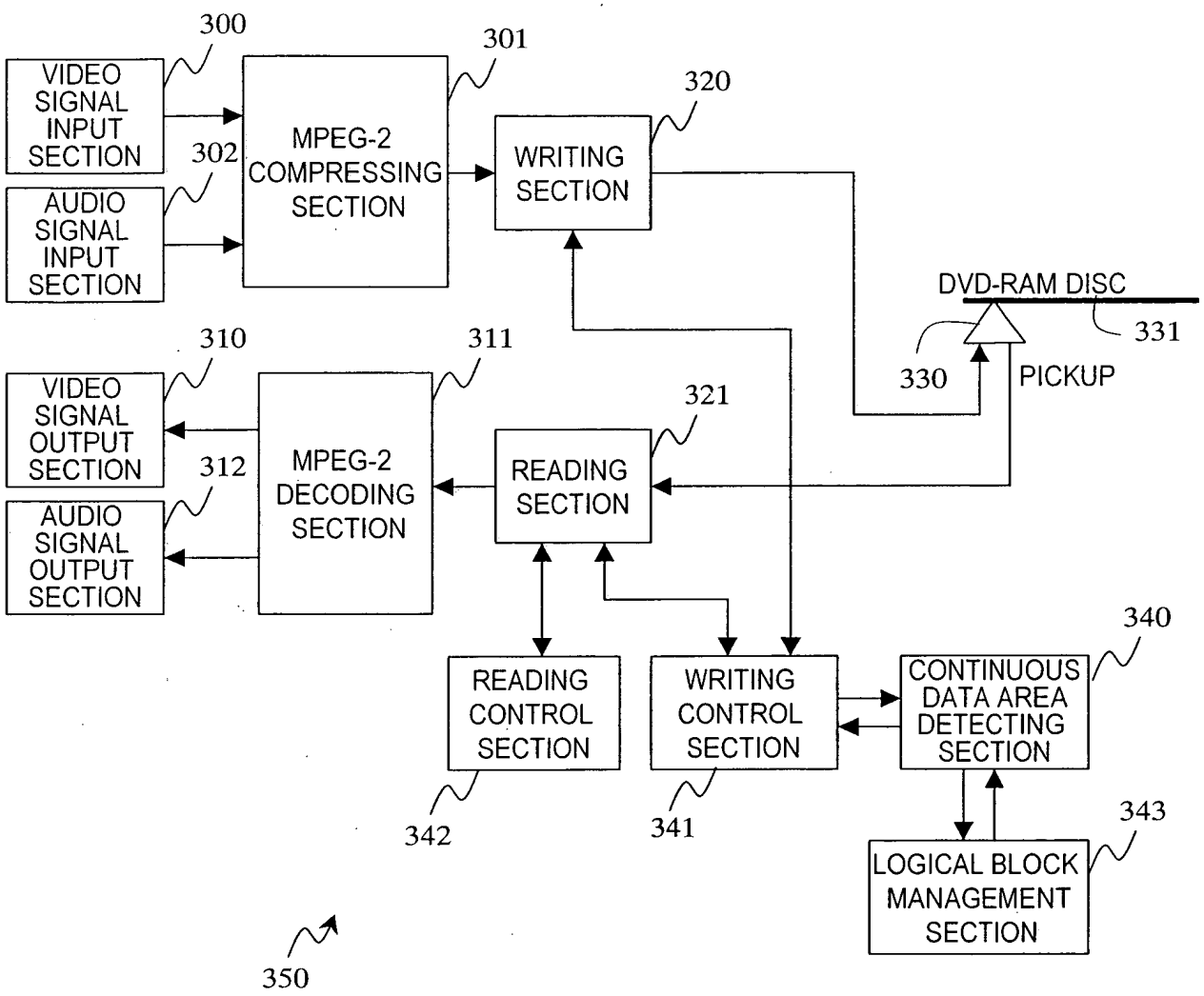

300
VIDEO SIGNAL INPUT SECTION
302
AUDIO SIGNAL INPUT SECTION
301
MPEG-2 COMPRESSING SECTION
320
WRITING SECTION
DVD-RAM DISC
331
330
PICKUP
310
VIDEO SIGNAL OUTPUT SECTION
312
AUDIO SIGNAL OUTPUT SECTION
311
MPEG-2 DECODING SECTION
321
READING SECTION
340
READING CONTROL SECTION
WRITING CONTROL SECTION
CONTINUOUS DATA AREA DETECTING SECTION
342
341
343
LOGICAL BLOCK MANAGEMENT SECTION
350

FIG.2

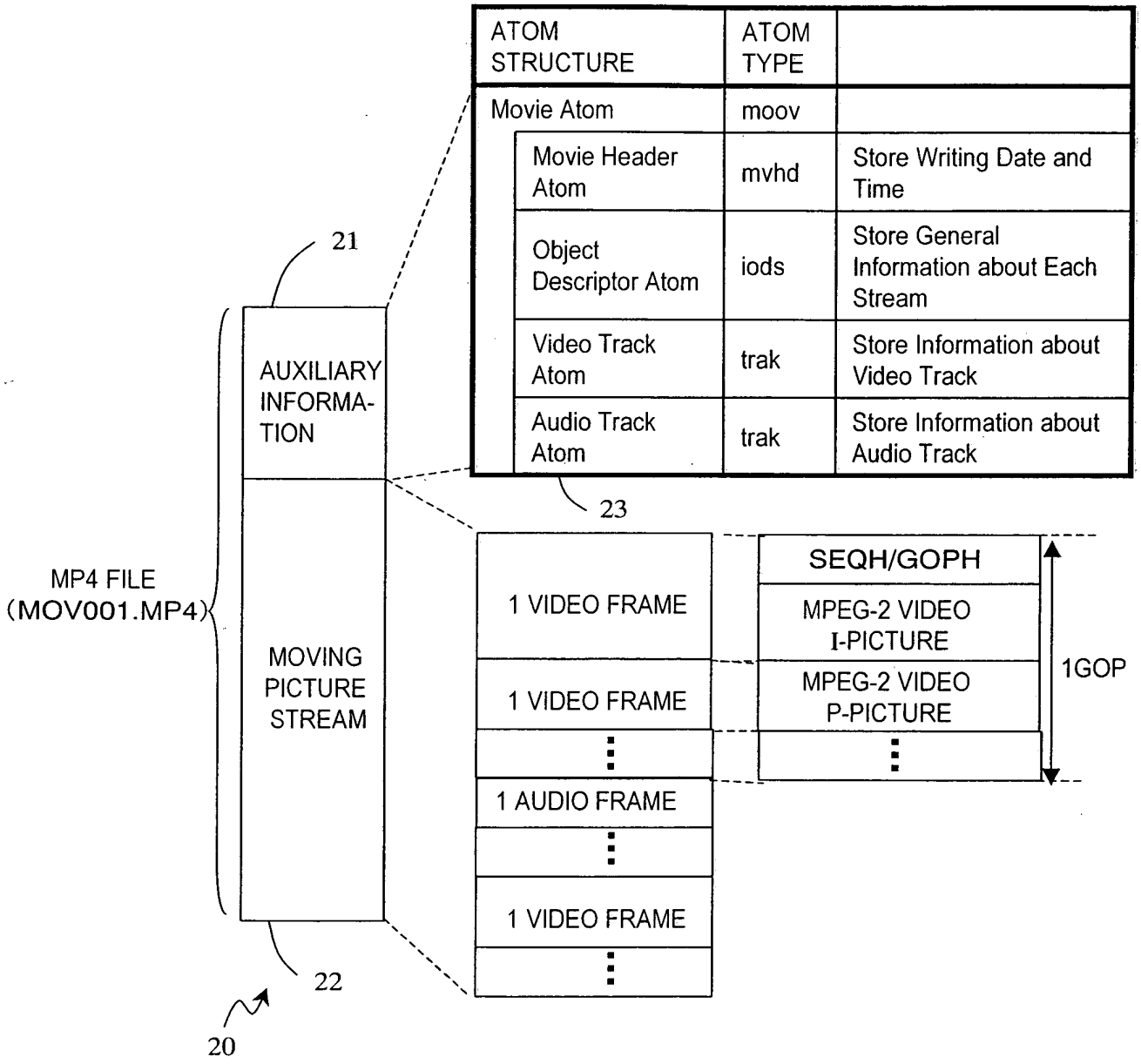

ATOM STRUCTURE
ATOM TYPE
Movie Atom
moov
Movie Header Atom
mvhd
Store Writing Date and Time
Object Descriptor Atom
iods
Store General Information about Each Stream
Video Track Atom
trak
Store Information about Video Track
Audio Track Atom
trak
Store Information about Audio Track
21
AUXILIARY INFORMA-TION
MP4 FILE (MOV001.MP4)
MOVING PICTURE STREAM
22
20
23
1 VIDEO FRAME
1 VIDEO FRAME
1 AUDIO FRAME
1 VIDEO FRAME
SEQH/GOPH
MPEG-2 VIDEO I-PICTURE
MPEG-2 VIDEO P-PICTURE
1GOP

FIG.3

ATOM STRUCTURE	ATOM TYPE
Movie Atom	moov
Movie Header Atom	mvhd
Object Descriptor Atom	iods
Video Track Atom	trak
Audio Track Atom	trak

ATOM STRUCTURE	ATOM TYPE	
VIDEO TRACK ATOM	trak	(Declaration of Track Atom)
Track Header Atom	tkhd	Store Track ID
Edit List Atom	edts	(Declaration of Edit List Atom)
Edit List Atom	elst	Specify Playback Range and Timings
Media Atom	mdia	(Declaration of Media Atom)
Media Header Atom	mdhd	Specify Time Information Unit
Handler Reference Atom	hdlr	Store Information Showing Identity as Video Track
Media Information Atom	minf	(Declaration of Media Information Atom)
Videol Media Header Atom	nmhd	Show Identity as Video Data
Data Information Atom	dinf	(Declaration of Data Information Atom)
Data Reference Atom	dref	Store Its File Name If Moving Picture Stream is Separate File
Sample Table Atom	stbl	(Declaration of Sample Table Atom)
Decoding Time to Sample Atom	stts	Store Decoding Time of Each Video Frame
Composition Time to Sample Atom	ctts	Store Presentation Time of Each Video Frame
Sample Description Atom	stsd	Store Information Showing Identity of Video Track as MPEG-2 Video and Store Audio Track Attribute
Sample Size Atom	stsz	Store Data Size of Each Video Frame
Sample to Chunk Atom	stsc	Store the Number of Video Frames to Make One Chunk
Chunk Offset Atom	stco	Store Top Address of Chunk

FIG.4

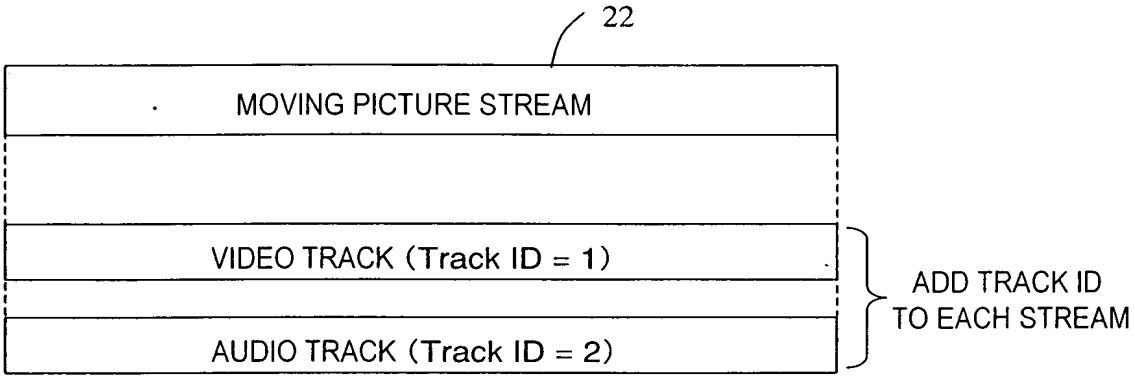

22
MOVING PICTURE STREAM
VIDEO TRACK (Track ID = 1)
AUDIO TRACK (Track ID = 2)
ADD TRACK ID
TO EACH STREAM

FIG.5

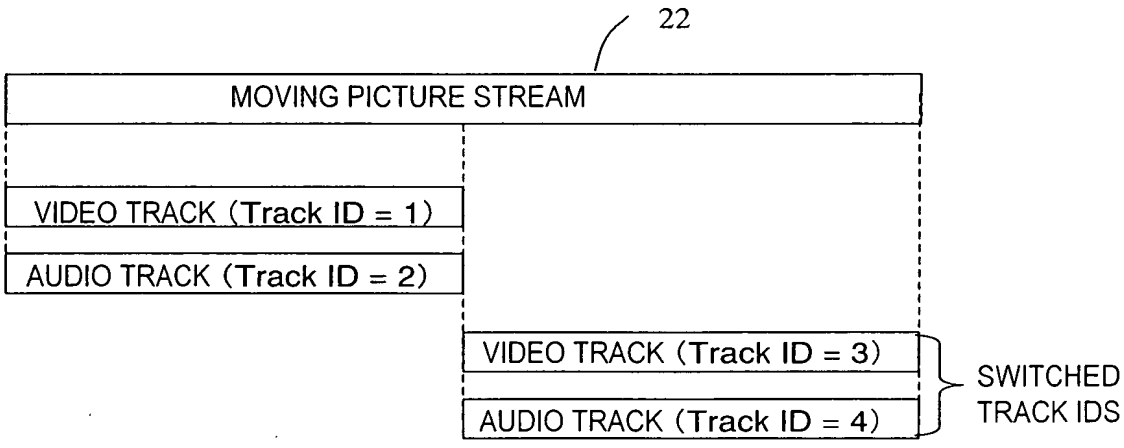

22
MOVING PICTURE STREAM
VIDEO TRACK (Track ID = 1)
AUDIO TRACK (Track ID = 2)
VIDEO TRACK (Track ID = 3)
AUDIO TRACK (Track ID = 4)
SWITCHED
TRACK IDS

FIG.6

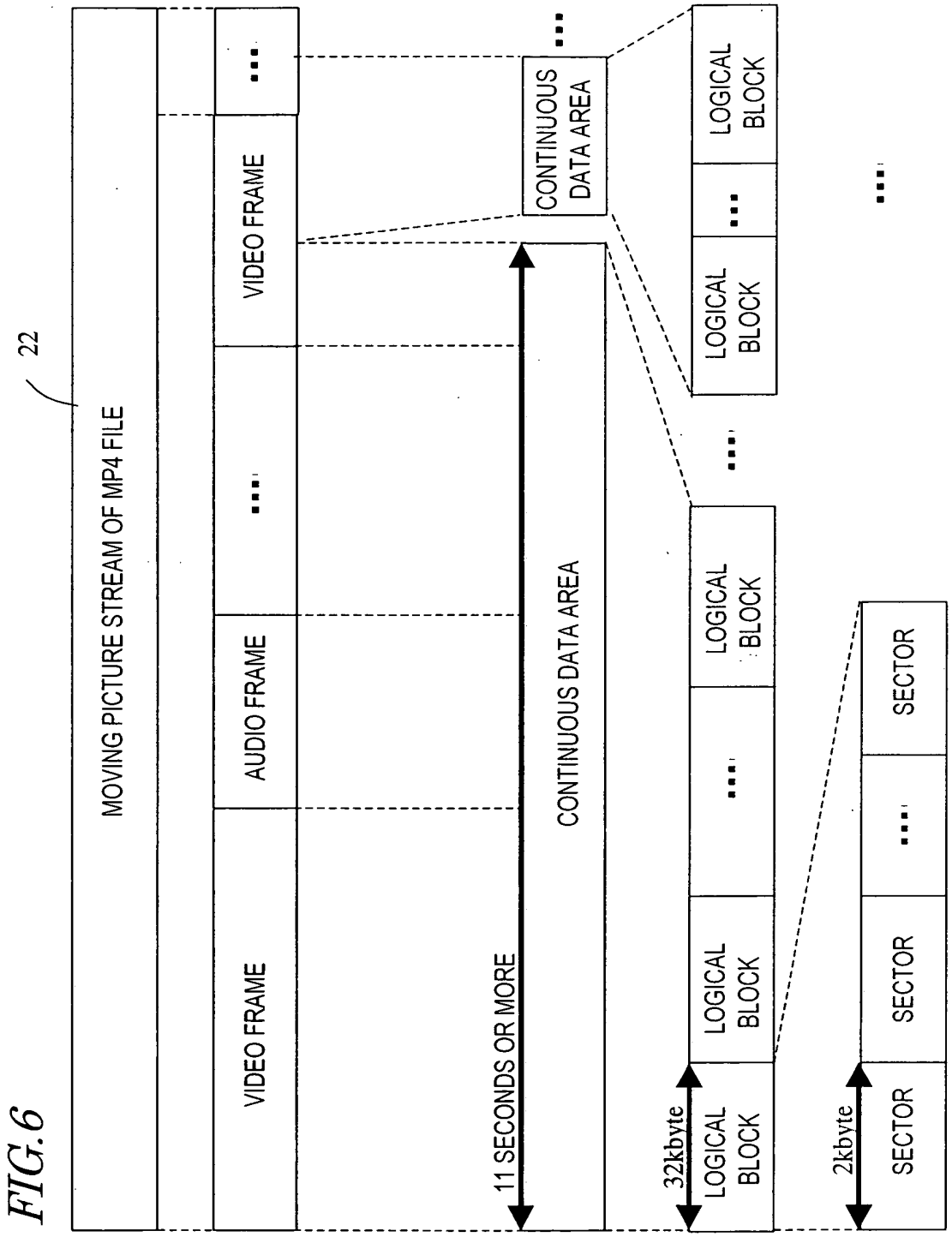

22
MOVING PICTURE STREAM OF MP4 FILE
VIDEO FRAME
AUDIO FRAME
VIDEO FRAME
11 SECONDS OR MORE
CONTINUOUS DATA AREA
CONTINUOUS DATA AREA
LOGICAL BLOCK
32kbyte
2kbyte
SECTOR

FIG. 7

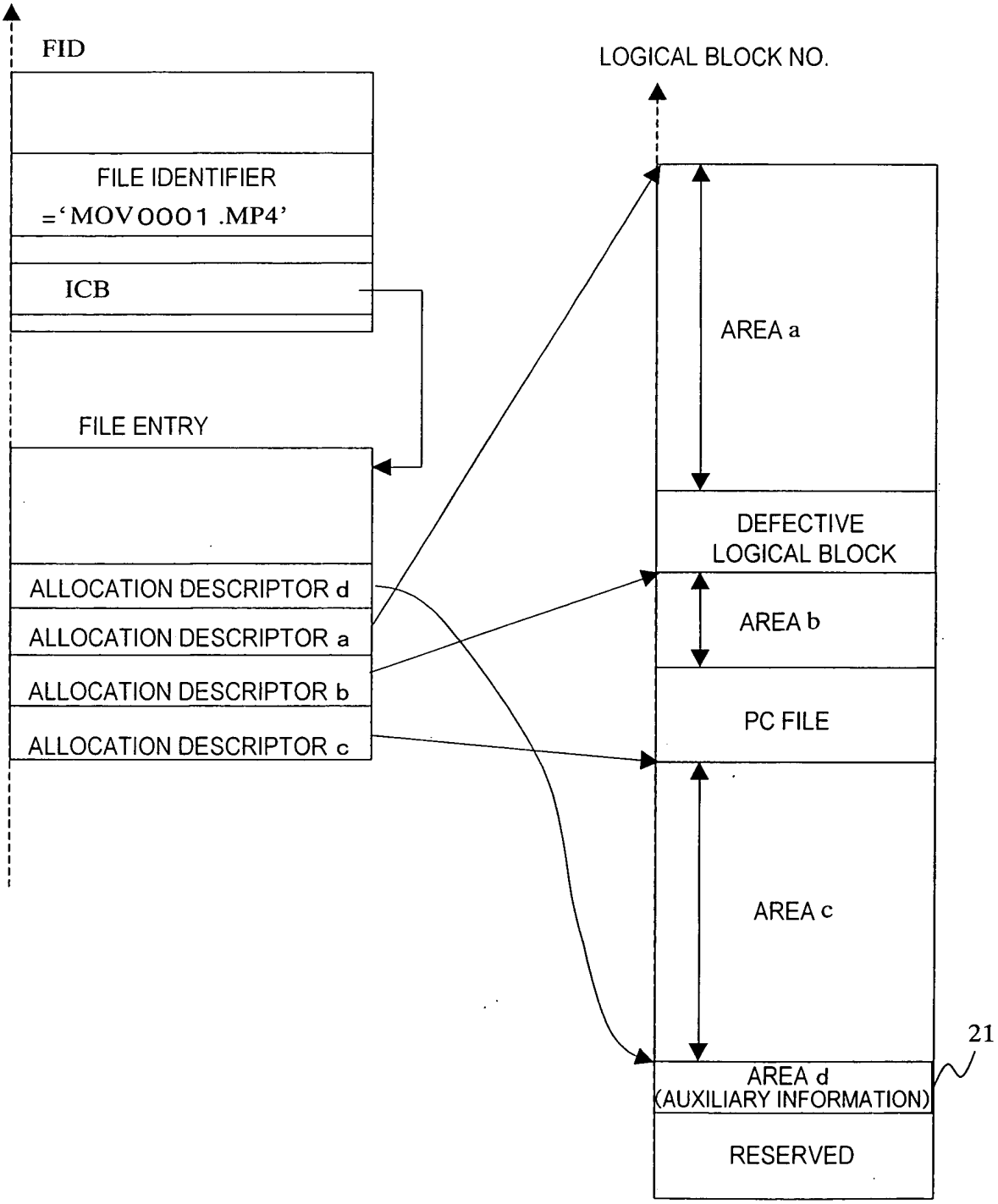

FID
FILE IDENTIFIER
='MOV0001 .MP4'
ICB
FILE ENTRY
ALLOCATION DESCRIPTOR d
ALLOCATION DESCRIPTOR a
ALLOCATION DESCRIPTOR b
ALLOCATION DESCRIPTOR c
LOGICAL BLOCK NO.
AREA a
DEFECTIVE LOGICAL BLOCK
AREA b
PC FILE
AREA c
AREA d (AUXILIARY INFORMATION)
RESERVED
21

FIG.8

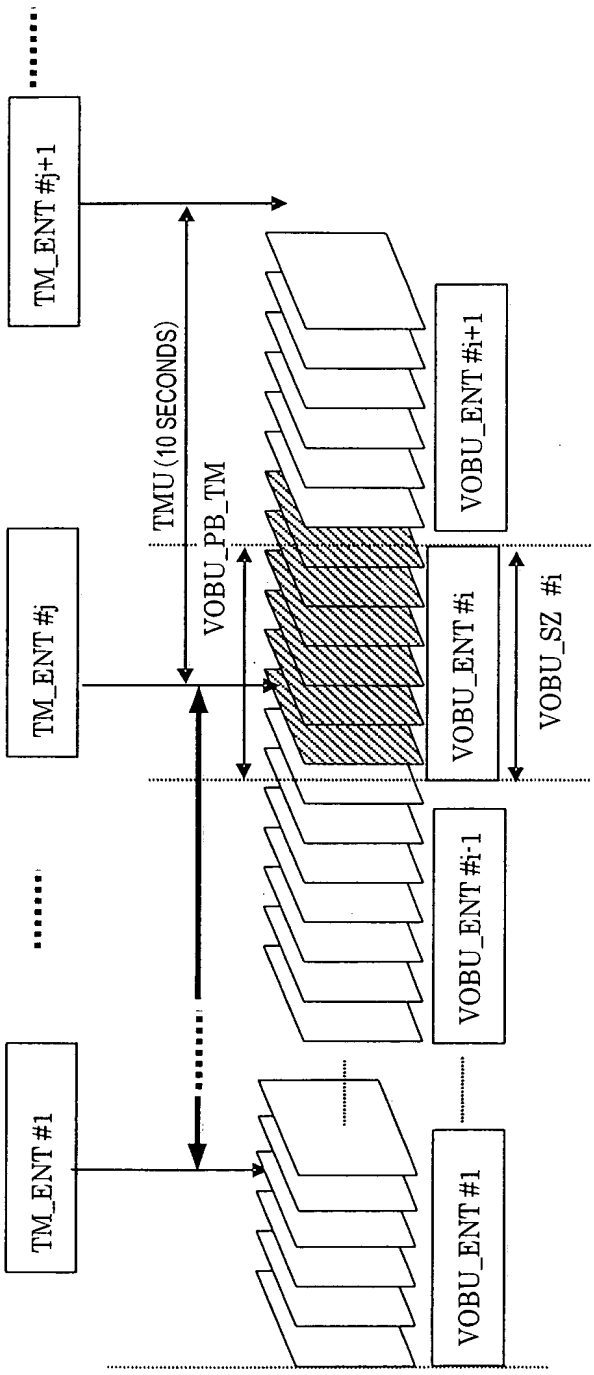

TM_ENT #j+1
TM_ENT #j
TM_ENT #1
TMU (10 SECONDS)
VOBU_PB_TM
VOBU_SZ #i
VOBU_ENT #i+1
VOBU_ENT #i
VOBU_ENT #i-1
VOBU_ENT #1

FIG.9

		FIELD NAME	SETTING
Time Map General Infomation		TMAP_GI	
	No. of Time Entries	TM_ENT_Ns	Total Number of Time Entries
	No. of VOBU Entries	VOBU_ENT_Ns	Total Number of VOBUs
	Time Offset	TM_OFS	Number of Video Fields
	Address Offset	ADR_OFS	Number of LBNs (F_RLBN)
Time Entry		TM_ENT	
	VOBU Entry Number	VOBU_ENTN	VOBU Entry No
	Time Difference	TM_DIFF	Number of Video Fields
	Target VOBU address	VOBU_ADR	Number of LBNs (F_RLBN)
VOBU Entry		VOBU_ENT	
	1st Reference Picture	1STREF_SZ	Number of Packs
	VOBU_PB_TM	VOBU_PB_TM	Number of Video Fields
	VOBU_SZ	VOBU_SZ	Number of Packs

FIG. 10

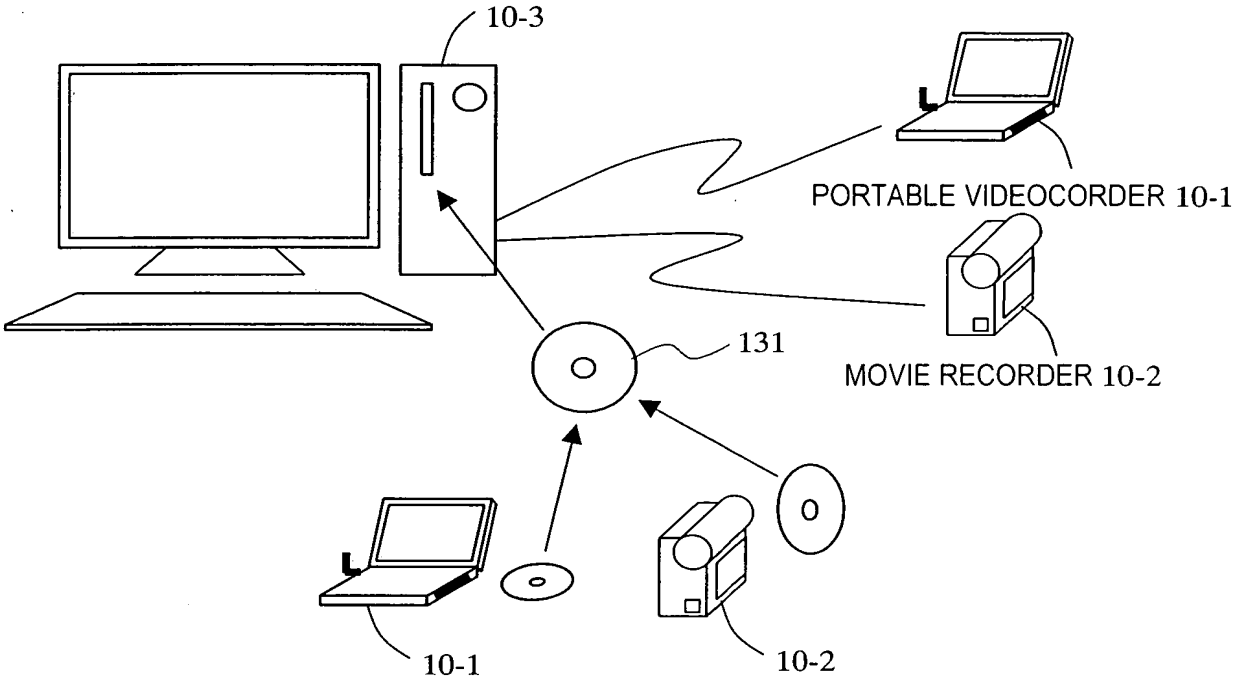

10-3
PORTABLE VIDEOCORDER 10-1
MOVIE RECORDER 10-2
131
10-1
10-2

FIG. 11

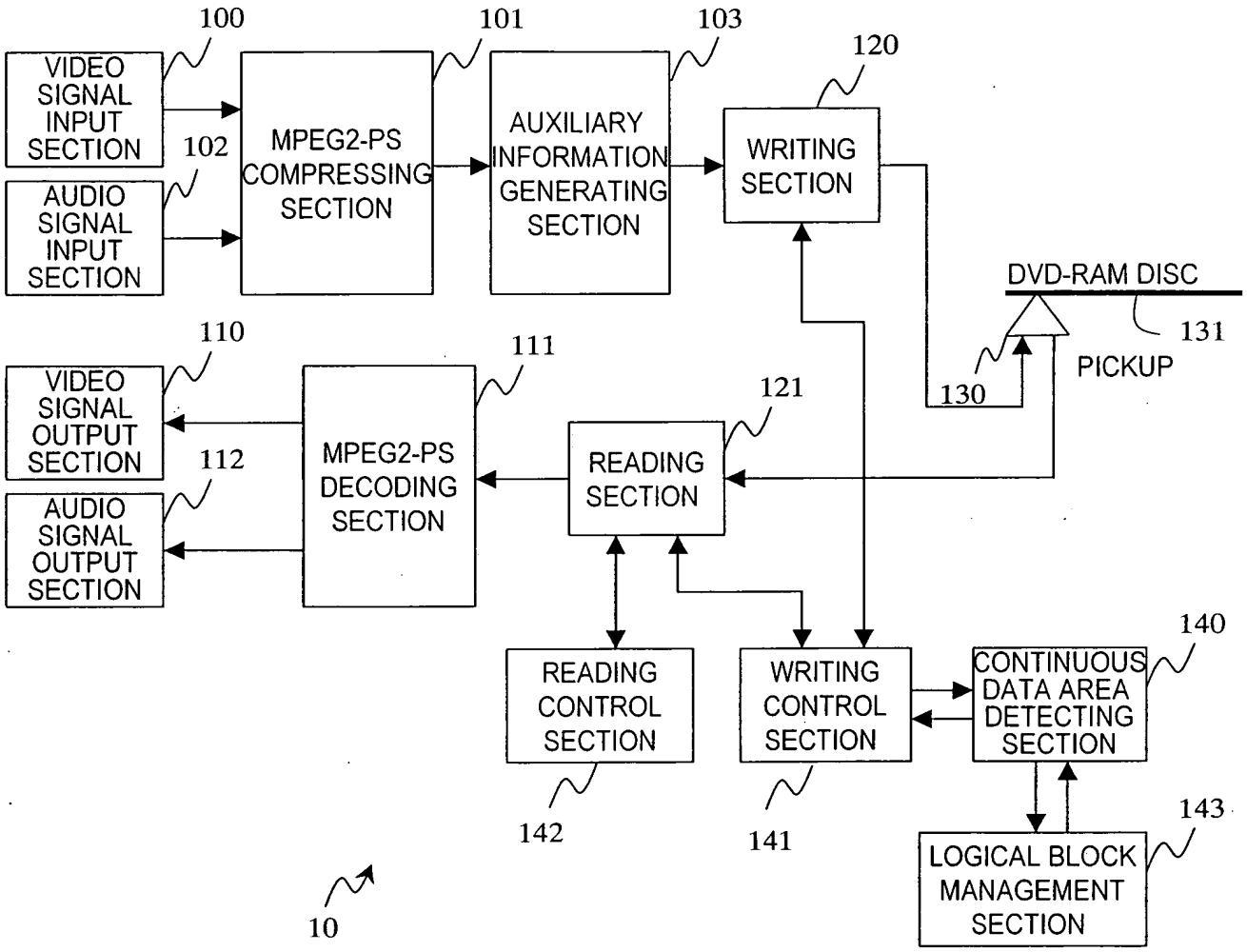

100
101
103
120
VIDEO SIGNAL INPUT SECTION
102
AUDIO SIGNAL INPUT SECTION
MPEG2-PS COMPRESSING SECTION
AUXILIARY INFORMATION GENERATING SECTION
WRITING SECTION
DVD-RAM DISC
131
PICKUP
130
110
111
121
VIDEO SIGNAL OUTPUT SECTION
112
AUDIO SIGNAL OUTPUT SECTION
MPEG2-PS DECODING SECTION
READING SECTION
140
READING CONTROL SECTION
WRITING CONTROL SECTION
CONTINUOUS DATA AREA DETECTING SECTION
142
141
143
LOGICAL BLOCK MANAGEMENT SECTION
10

FIG. 12

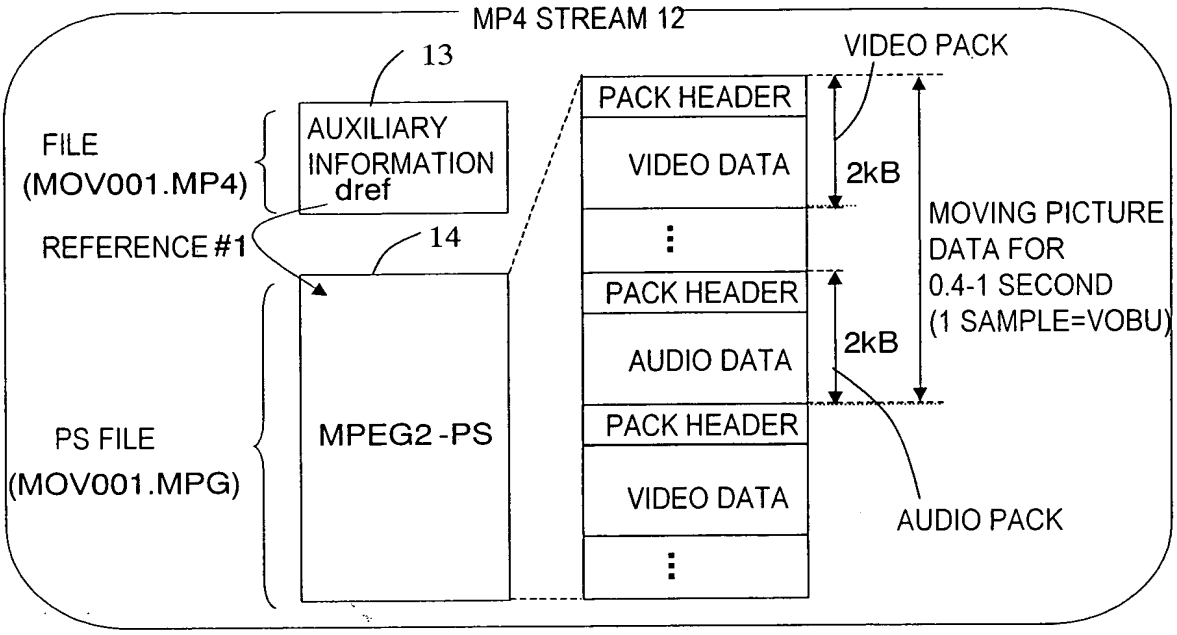

MP4 STREAM 12
13
VIDEO PACK
FILE
(MOV001.MP4)
AUXILIARY
INFORMATION
dref
REFERENCE #1
14
PACK HEADER
VIDEO DATA
2kB
PACK HEADER
AUDIO DATA
2kB
PACK HEADER
VIDEO DATA
MOVING PICTURE
DATA FOR
0.4-1 SECOND
(1 SAMPLE=VOBU)
PS FILE
(MOV001.MPG)
MPEG2-PS
AUDIO PACK

FIG. 13

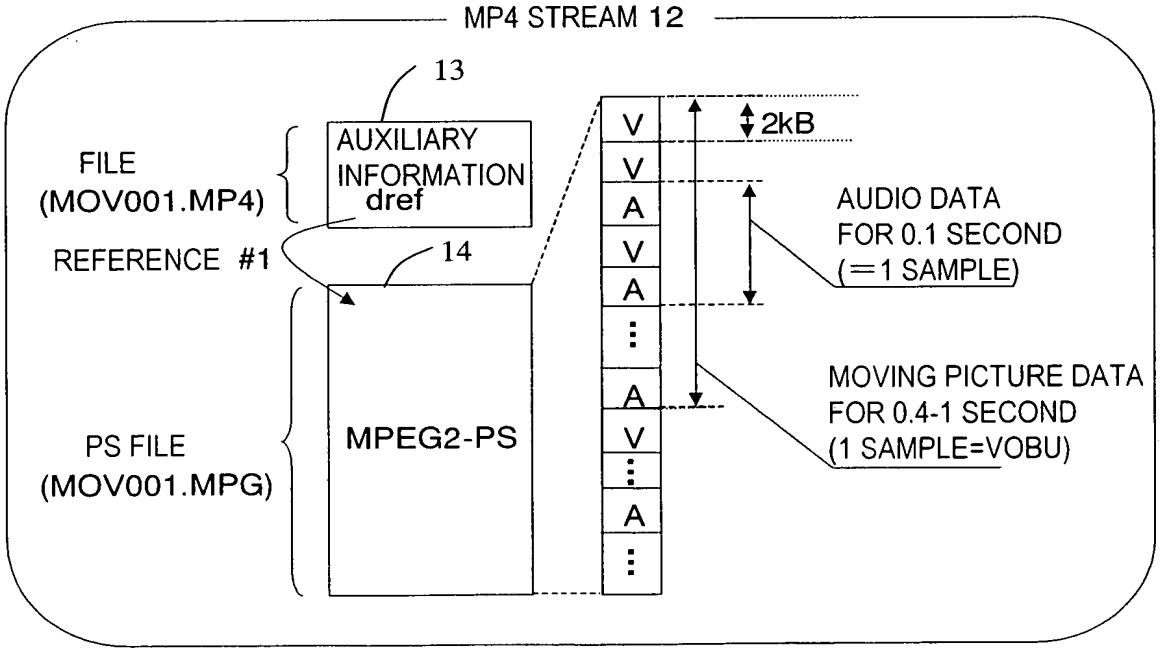

MP4 STREAM 12
13
FILE
(MOV001.MP4)
AUXILIARY
INFORMATION
dref
REFERENCE #1
14
V
V
A
V
A
A
V
A
2kB
AUDIO DATA
FOR 0.1 SECOND
(=1 SAMPLE)
MOVING PICTURE DATA
FOR 0.4-1 SECOND
(1 SAMPLE=VOBU)
PS FILE
(MOV001.MPG)
MPEG2-PS

FIG.14

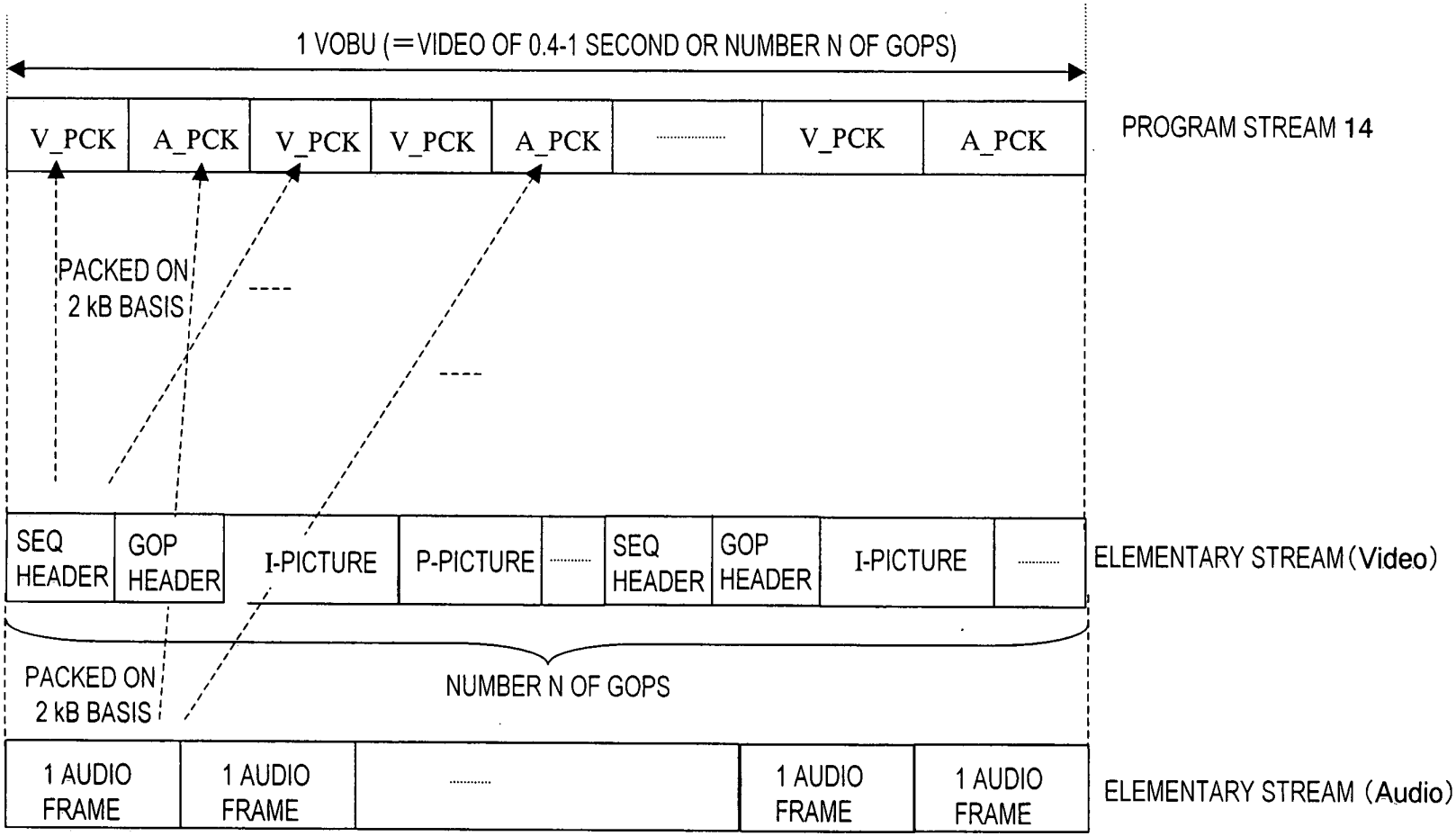
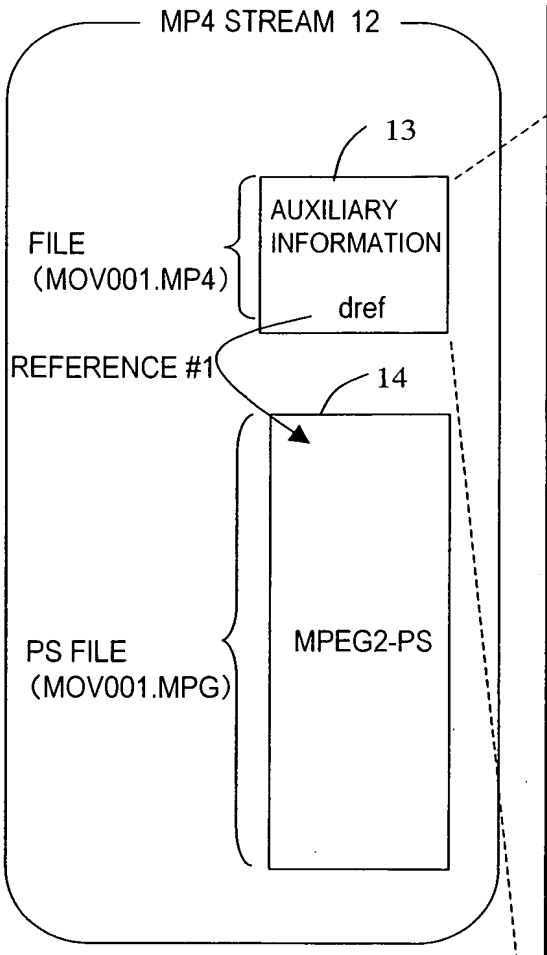

1 VOBU (=VIDEO OF 0.4-1 SECOND OR NUMBER N OF GOPS)
V_PCK
A_PCK
V_PCK
V_PCK
A_PCK
V_PCK
A_PCK
PROGRAM STREAM 14
PACKED ON 2 kB BASIS
SEQ HEADER
GOP HEADER
I-PICTURE
P-PICTURE
SEQ HEADER
GOP HEADER
I-PICTURE
ELEMENTARY STREAM (Video)
PACKED ON 2 kB BASIS
NUMBER N OF GOPS
1 AUDIO FRAME
1 AUDIO FRAME
1 AUDIO FRAME
1 AUDIO FRAME
ELEMENTARY STREAM (Audio)

FIG. 15



ATOM STRUCTURE	ATOM TYPE
Movie Atom	moov
Movie Header Atom	mvhd
Object Descriptor Atom	iods
Track Atom	trak
Track Header Atom	tkhd
Edit List Atom	edts
Edit List Atom	elst
Media Atom	mdia
Media Header Atom	mdhd
Handler Reference Atom	hdlr
Media Information Atom	minf
Null Media Header Atom	nmhd
Data Information Atom	dinf
Data Reference Atom	dref
Sample Table Atom	stbl
Decoding Time to Sample Atom	stts
Sample Description Atom	stsd
Sample Size Atom	stsz
Sample to Chunk Atom	stsc
Chunk Offset Atom	stco
User Data Atom	udta
Reference Picture Size Atom	rfsz

15
16
17

FIG. 16

ATOM STRUCTURE	ATOM TYPE	
Movie Atom	moov	(Declaration of Movie Atom)
Movie Header Atom	mvhd	Store Writing Date and Time
Object Descriptor Atom	iods	Store General Information about Each Stream
Track Atom	trak	(Declaration of Track Atom)
Track Header Atom	tkhd	Store Track ID
Edit List Atom	edts	(Declaration of Edit List Atom)
Edit List Atom	elst	Specify Playback Range and Timings
Media Atom	mdia	(Declaration of Media Atom)
Media Header Atom	mdhd	Specify Time Information Unit
Handler Reference Atom	hdlr	Store Handler_type="m2ps" Showing Identity as MPEG2-PS
Media Information Atom	minf	(Declaration of Media Information Atom)
Null Media Header Atom	nmhd	Show Identity as Neither Video Frame nor Audio Frame
Data Information Atom	dinf	(Declaration of Data Information Atom)
Data Reference Atom	dref	Store Moving Picture Stream File in URL Form
Sample Table Atom	stbl	(Declaration of Sample Table Atom)
Decoding Time to Sample Atom	stts	Store Playback Duration of Each VOBU
Sample Description Atom	stsd	Show Specifications of MPEG2-PS
Sample Size Atom	stsz	Store Size of Each VOBU
Sample to Chunk Atom	stsc	Store the Number of VOBUs to Make One Chunk When Overall MPEG File is Treated as One Chunk
Chunk Offset Atom	stco	Store Chunk Offset=0 as MPEG2-PS Starts from Beginning of MPEG File
User Data Atom	udta	(Declaration of User Data Atom)
Reference Picture Size Atom	rfsz	Store End Location of Top I-Frame of Each VOBU as Offset Value from Top of VOBU

FIG. 17

Data Reference Atom 15

field	value
size	33
type	'dref'
entry_count	1
DataEntryUrlAtom	

DataEntryUrlAtom

field	value
size	21
type	'url '
location	'./MOV0001.MPG'

FIG.18

ATOM TYPE			FIELD NAME	REPEAT-ABLE ?	DATA SIZE [UNIT]	DESCRIPTION	SETTING	
Sample Table Atom		stbl						
	Decoding Time to Sample Atom	stts	entry- count		4[Byte]	Number of Entries		
			sample-count	○	4[Byte]	Number of Samples		
			sample delta	○	4[Byte]	Sample time scale	VOBU_ENT	VOBU_PB_TM
	Sample Description Atom	m2av (NEW)						
	Sample Size Atom	stsz	sample-size		4[Byte]	Default Sample Data Size		
			sample count		4[Byte]	Number of Samples	VOBU_ENT	VOBU_ENT_Ns
			entry-size		4[Byte]	Sample Data Size	VOBU_ENT	VOBU_SZ
	Sample to Chunk Atom	stsc	entry-count		4[Byte]	Number of Entries	1 Entry	
			first-chunk	○	4[Byte]	Chunk Index Number		
			samples-per-chunk	○	4[Byte]	Number of Samples	VOBU_ENT	VOBU_ENT_Ns
			sample-description-index	○	4[Byte]	Sample description Index Number		
	Chunk Offset Atom	stco	entry-count		4[Byte]	Number of Entries	1 Entry	
			chunk-offset		4[Byte]	Chunk Offset	TMAP_GI	ADR_OFS
In User Data Atom	Reference Picture Size Atom	rtsz (NEW)	entry-count		4[Byte]	Number of Entries		
			sync-sample-size	○	4[Byte]	Sync Sample Data Size	VOBU_ENT	1STREF_SZ

16

17

FIG.19

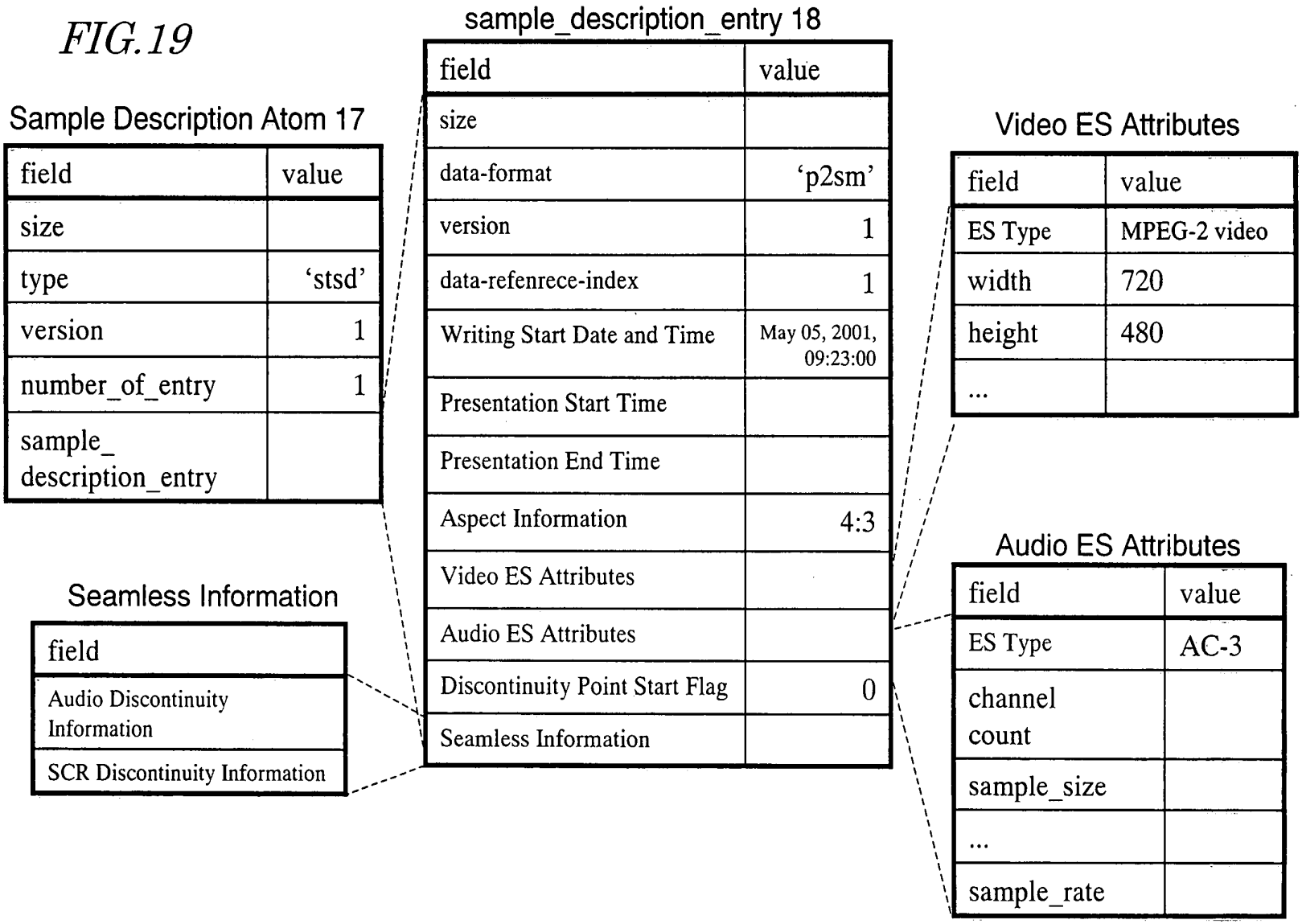

Sample Description Atom 17
field
value
size
type
'stsd'
version
1
number_of_entry
1
sample_ description_entry
sample_description_entry 18
field
value
size
data-format
'p2sm'
version
1
data-refenrece-index
1
Writing Start Date and Time
May 05, 2001, 09:23:00
Presentation Start Time
Presentation End Time
Aspect Information
4:3
Video ES Attributes
Audio ES Attributes
Discontinuity Point Start Flag
0
Seamless Information
Video ES Attributes
field
value
ES Type
MPEG-2 video
width
720
height
480
...
Audio ES Attributes
field
value
ES Type
AC-3
channel count
sample_size
...
sample_rate
Seamless Information
field
Audio Discontinuity Information
SCR Discontinuity Information

FIG.20

sample_description_entry 18

field	value	Complement
size		Store Data Size of sample_description_entry
data-format	'p2sm'	Information Showing Identity as MPEG2-PS Including MPEG-2 Video
version	1	Version Number of Specifications
data-refenrece-index	1	Store ID Referenced by chunk offset atom
Writing Start Date and Time	May 05, 2001, 09:23:00	Store Writing Start Date and Time
Presentation Start Time		Store Timing Information about First Video Frame
Presentation End Time		Store Timing Information about Last Video Frame
Aspect Information	4:3	Store Aspect Information
Video ES Attributes		Store Information about Video Stream
Audio ES Attributes		Store Information about Audio Stream
Discontinuity Point Start Flag	0	Indicate That Previous and Current Moving Picture Streams are Completely Continuous Program Stream
Seamless Information		Store Information about Seamless Playback If Previous and Current Moving Picture Streams are Discontinuous

FIG.21

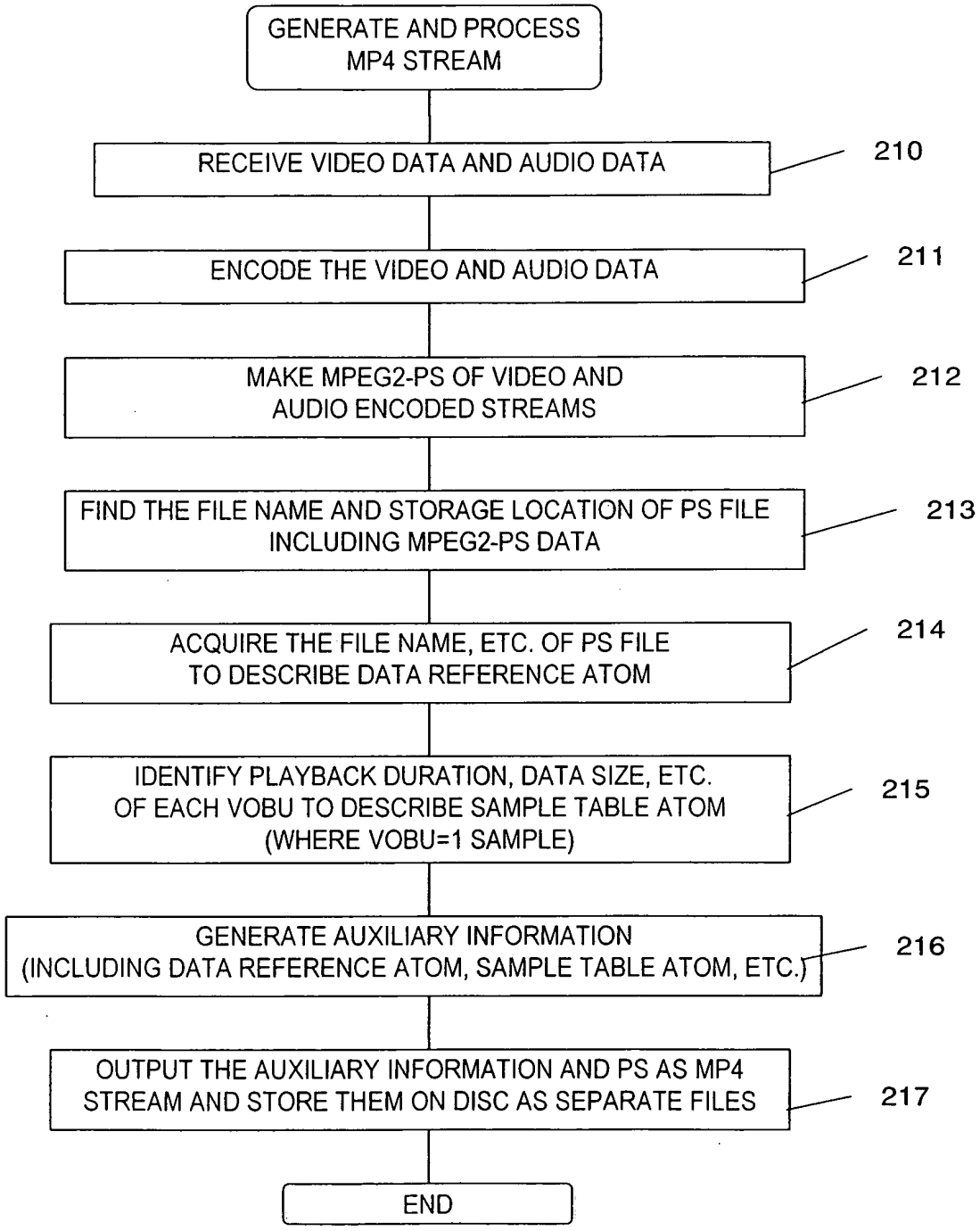

GENERATE AND PROCESS MP4 STREAM
RECEIVE VIDEO DATA AND AUDIO DATA
210
ENCODE THE VIDEO AND AUDIO DATA
211
MAKE MPEG2-PS OF VIDEO AND AUDIO ENCODED STREAMS
212
FIND THE FILE NAME AND STORAGE LOCATION OF PS FILE INCLUDING MPEG2-PS DATA
213
ACQUIRE THE FILE NAME, ETC. OF PS FILE TO DESCRIBE DATA REFERENCE ATOM
214
IDENTIFY PLAYBACK DURATION, DATA SIZE, ETC. OF EACH VOBU TO DESCRIBE SAMPLE TABLE ATOM (WHERE VOBU=1 SAMPLE)
215
GENERATE AUXILIARY INFORMATION (INCLUDING DATA REFERENCE ATOM, SAMPLE TABLE ATOM, ETC.)
216
OUTPUT THE AUXILIARY INFORMATION AND PS AS MP4 STREAM AND STORE THEM ON DISC AS SEPARATE FILES
217
END

FIG.22

		MPEG2 Video (ES)		MPEG2-PS	
		M/O	CONVENTIONAL EXAMPLE	THE PRESENT INVENTION (1)	THE PRESENT INVENTION (2)
STRUC-TURAL CONCEPT	sample	M	video frame	VOBU	Video Frame with Pack Header
	chunk	M	GOP	Overall Series of VOBUs (or VOB)	VOBU
	sync-sample	O	GOP with SEQ	—	—
ATOMS TO MAKE UP SAMPLE TABLE ATOM	Decoding Time to Sample Atom	M	video frame Period	VOBU Playback Duration	video frame Period (Fixed)
	Sample Size Atom	M	video frame size	VOBU Size	— (Not Used)
	Sample Description Atom	M	Stream Information	Stream Information	Stream Information
	Sample to Chunk Atom	M	Playback Duration of Each Chunk	Total Number of VOBUs (for One Entry)	Playback Duration of Each VOBU
	Chunk Offset Atom	M	Top Address of Each Chunk	Top Address of VOBU (for One Entry)	— (Not Used)
	VOBU Size Atom (NEW)	—	—	—	VOBU Size
IN USER DATA ATOM	Reference Picture Size Atom (NEW)	—	—	I-frame size	I-frame size

FIG.23

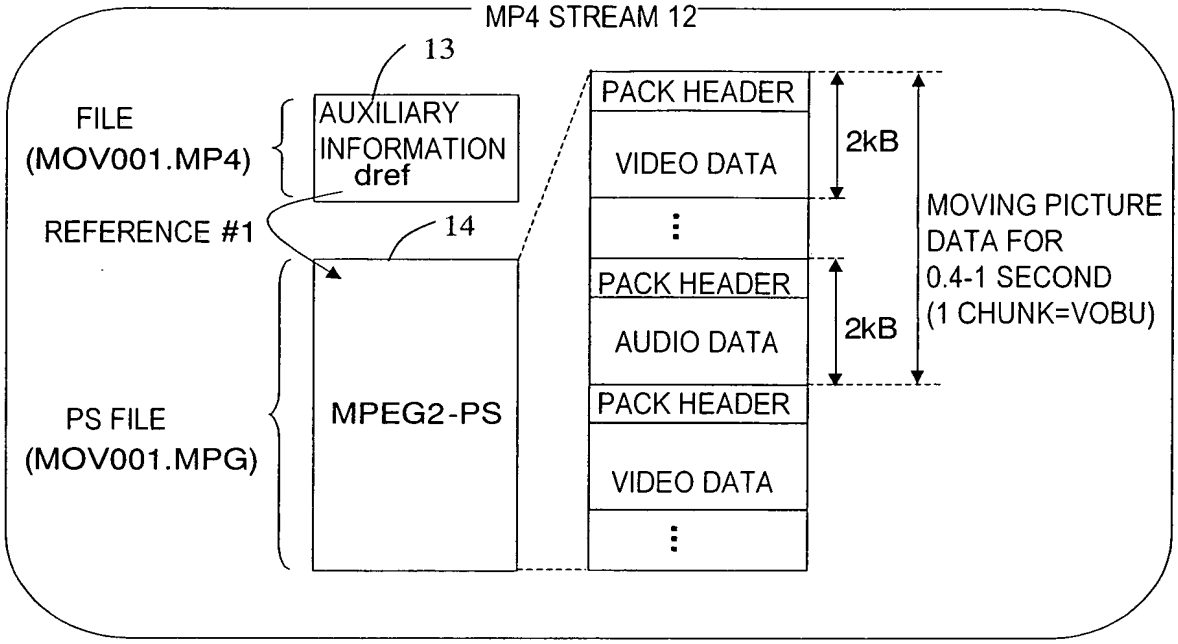
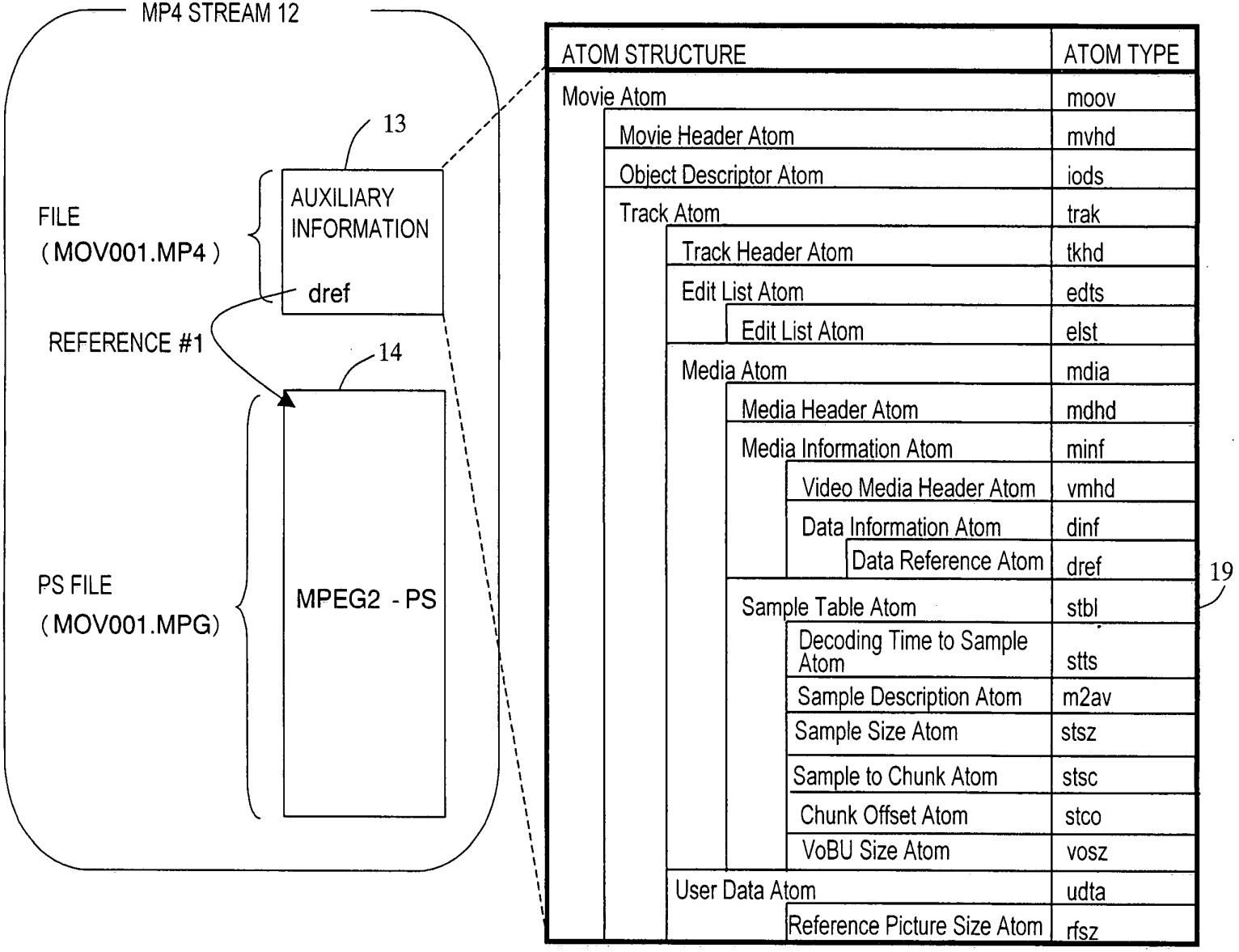

MP4 STREAM 12
13
FILE
(MOV001.MP4)
AUXILIARY
INFORMATION
dref
REFERENCE #1
14
PS FILE
(MOV001.MPG)
MPEG2-PS
PACK HEADER
VIDEO DATA
PACK HEADER
AUDIO DATA
PACK HEADER
VIDEO DATA
2kB
2kB
MOVING PICTURE
DATA FOR
0.4-1 SECOND
(1 CHUNK=VOBU)

FIG.24



ATOM STRUCTURE	ATOM TYPE
Movie Atom	moov
Movie Header Atom	mvhd
Object Descriptor Atom	iods
Track Atom	trak
Track Header Atom	tkhd
Edit List Atom	edts
Edit List Atom	elst
Media Atom	mdia
Media Header Atom	mdhd
Media Information Atom	minf
Video Media Header Atom	vmhd
Data Information Atom	dinf
Data Reference Atom	dref
Sample Table Atom	stbl
Decoding Time to Sample Atom	stts
Sample Description Atom	m2av
Sample Size Atom	stsz
Sample to Chunk Atom	stsc
Chunk Offset Atom	stco
VoBU Size Atom	vosz
User Data Atom	udta
Reference Picture Size Atom	rfsz

19

FIG.25

19

ATOM TYPE		FIELD NAME	REPEATABLE ?	DATA SIZE [UNIT]	DESCRIPTION	SETTING	
Sample Table Atom	stbl						
Decoding Time to Sample Atom	stts	entry-count		4[Byte]	Number of Entries	1 Entry	
		sample-count	○	4[Byte]	Number of Samples	Total Number of Video Frames	
		sample delta	○	4[Byte]	Sample time scale	100/3001 sec	
Sample Description Atom	m2av (NEW)						
Sample Size Atom	stsz	sample-size		4[Byte]	Default Sample Data Size	Not Used	
		sample count		4[Byte]	Number of Samples		
		entry-size	○	4[Byte]	Sample Data Size		
Sample to Chunk Atom	stsc	entry-count		4[Byte]	Number of Entries	TMAP_GI	VOBU_ENT_Ns
		first-chunk	○	4[Byte]	Chunk Index Number		
		samples-per-chunk	○	4[Byte]	Number of Samples	VOBU_ENT	VOBU_PB_TM
		sample-description-index	○	4[Byte]	Sample Description Index Number		
Chunk Offset Atom	stco	entry-count		4[Byte]	Number of Entries	Not Used	
		chunk-offset		4[Byte]	Chunk Offset		
VoBU Size Atom	vosz (NEW)	VOBU-size	○	4[Byte]	VOBU Data Size	VOBU_ENT	VOBU_SZ
Reference Picture Size Atom	rfsz (NEW)		○	4[Byte]	End Address of First I-Picture in VOBU	VOBU_ENT	1STREF_SZ

FIG.26

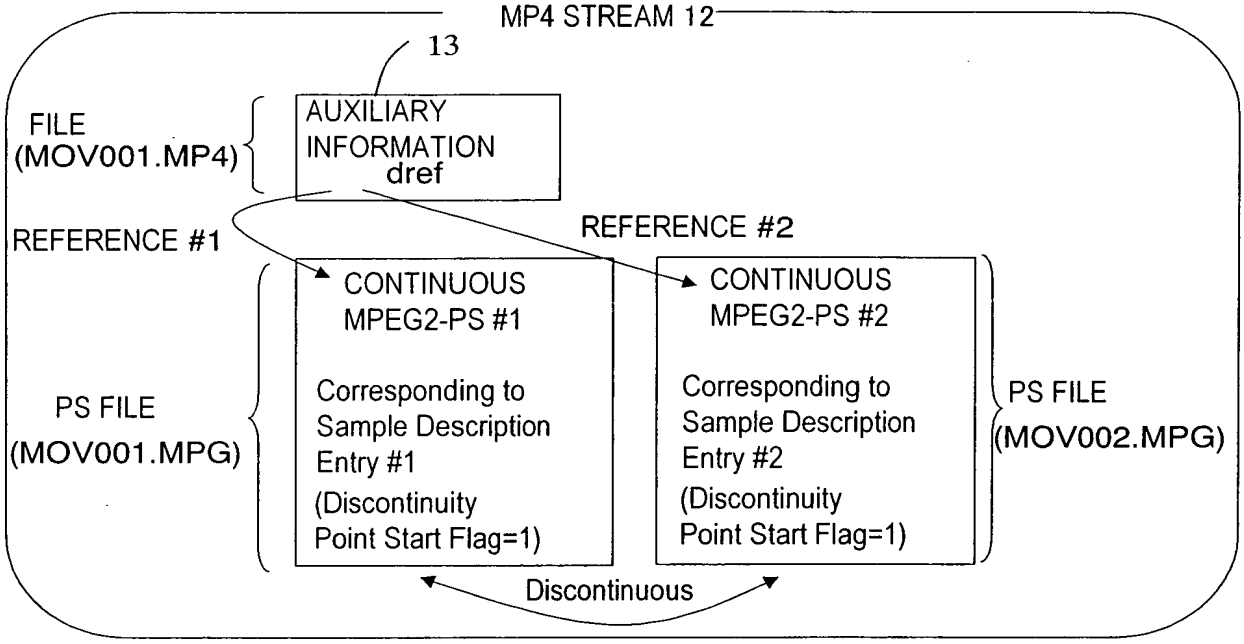

MP4 STREAM 12
13
FILE
(MOV001.MP4)
AUXILIARY
INFORMATION
dref
REFERENCE #1
REFERENCE #2
CONTINUOUS
MPEG2-PS #1
CONTINUOUS
MPEG2-PS #2
PS FILE
(MOV001.MPG)
Corresponding to
Sample Description
Entry #1
(Discontinuity
Point Start Flag=1)
Corresponding to
Sample Description
Entry #2
(Discontinuity
Point Start Flag=1)
PS FILE
(MOV002.MPG)
Discontinuous

FIG.27

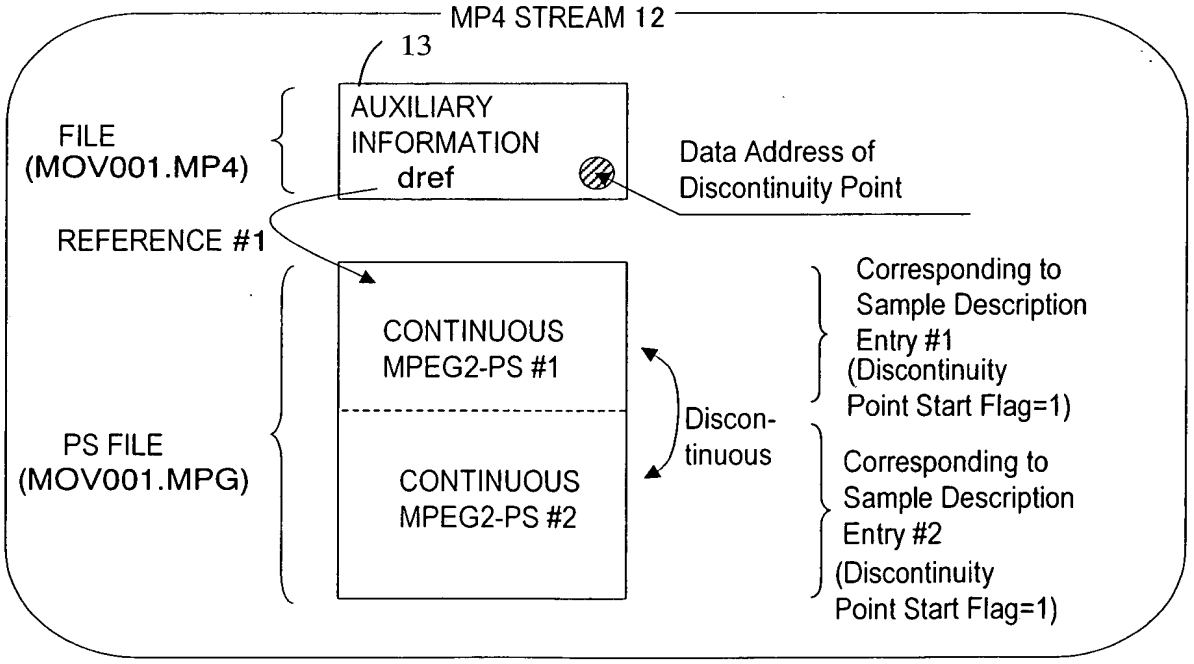

MP4 STREAM 12
13
FILE
(MOV001.MP4)
AUXILIARY
INFORMATION
dref
Data Address of
Discontinuity Point
REFERENCE #1
CONTINUOUS
MPEG2-PS #1
CONTINUOUS
MPEG2-PS #2
PS FILE
(MOV001.MPG)
Discon-
tinuous
Corresponding to
Sample Description
Entry #1
(Discontinuity
Point Start Flag=1)
Corresponding to
Sample Description
Entry #2
(Discontinuity
Point Start Flag=1)

FIG.28

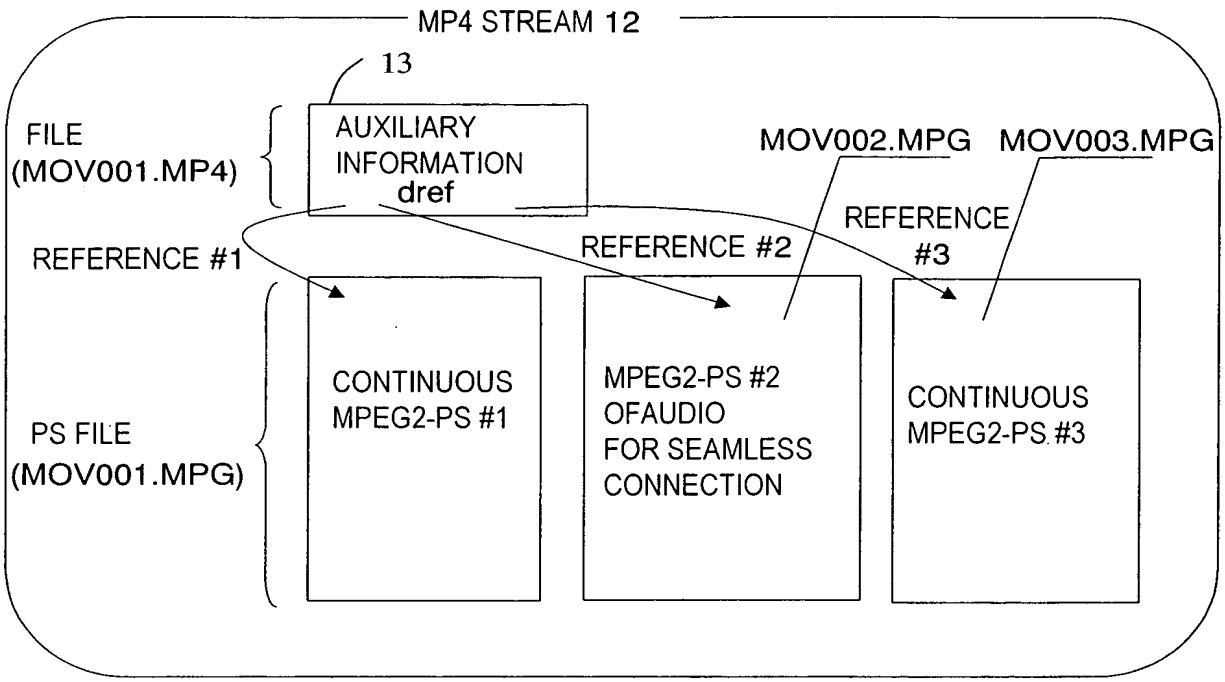

MP4 STREAM 12
13
FILE
(MOV001.MP4)
AUXILIARY
INFORMATION
dref
MOV002.MPG
MOV003.MPG
REFERENCE
#3
REFERENCE #1
REFERENCE #2
PS FILE
(MOV001.MPG)
CONTINUOUS
MPEG2-PS #1
MPEG2-PS #2
OFAUDIO
FOR SEAMLESS
CONNECTION
CONTINUOUS
MPEG2-PS #3

FIG.29

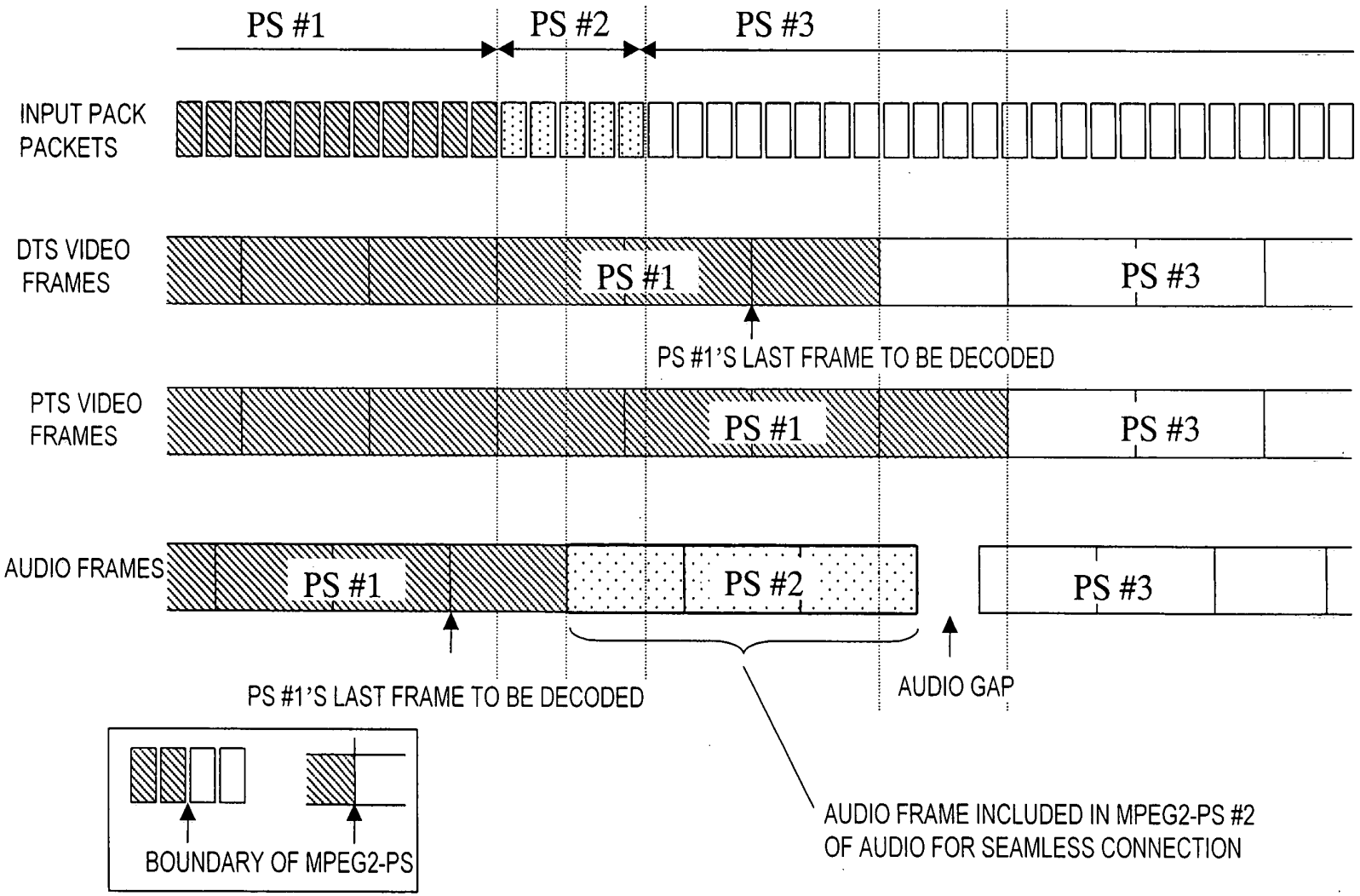

PS #1
PS #2
PS #3
INPUT PACK PACKETS
DTS VIDEO FRAMES
PS #1
PS #3
PS #1'S LAST FRAME TO BE DECODED
PTS VIDEO FRAMES
PS #1
PS #3
AUDIO FRAMES
PS #1
PS #2
PS #3
PS #1'S LAST FRAME TO BE DECODED
AUDIO GAP
BOUNDARY OF MPEG2-PS
AUDIO FRAME INCLUDED IN MPEG2-PS #2
OF AUDIO FOR SEAMLESS CONNECTION

FIG.30

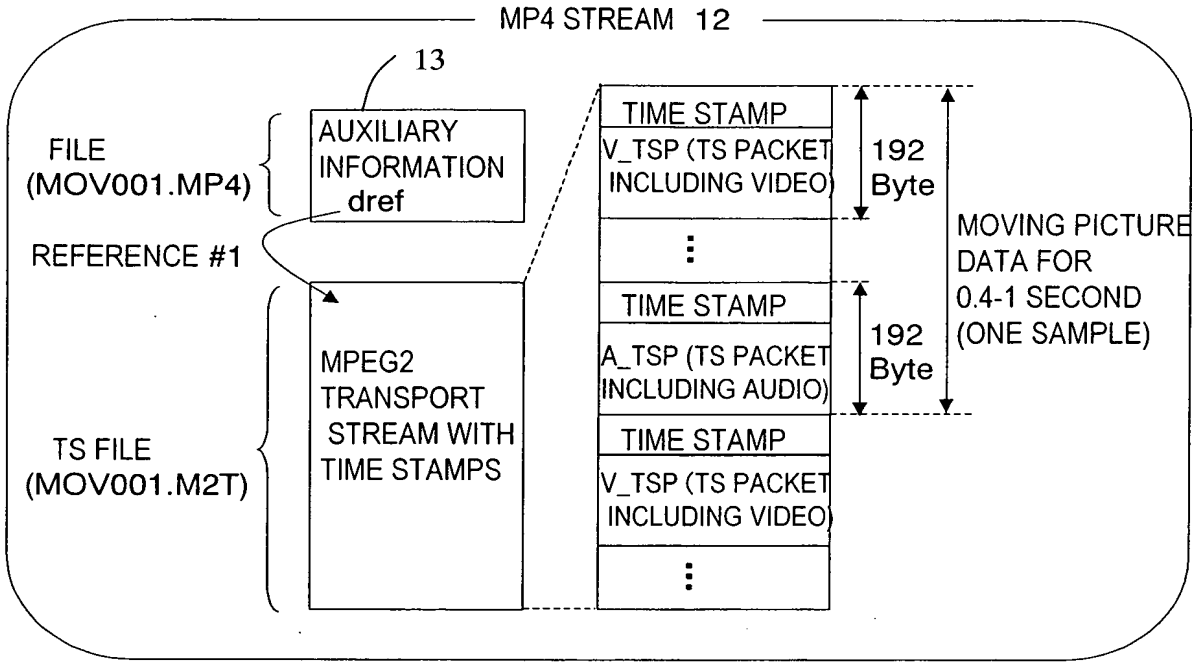

MP4 STREAM 12
13
FILE
(MOV001.MP4)
AUXILIARY
INFORMATION
dref
REFERENCE #1
TS FILE
(MOV001.M2T)
MPEG2
TRANSPORT
STREAM WITH
TIME STAMPS
TIME STAMP
V_TSP (TS PACKET
INCLUDING VIDEO)
192
Byte
TIME STAMP
A_TSP (TS PACKET
INCLUDING AUDIO)
192
Byte
TIME STAMP
V_TSP (TS PACKET
INCLUDING VIDEO)
MOVING PICTURE
DATA FOR
0.4-1 SECOND
(ONE SAMPLE)

FIG.31

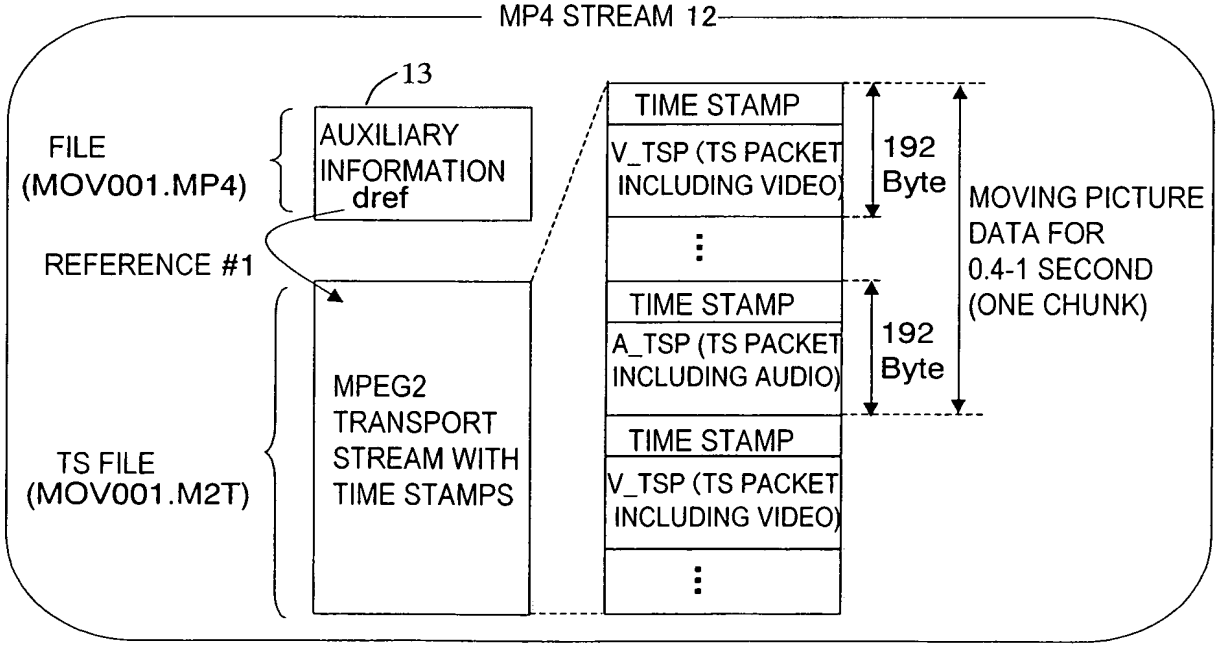

MP4 STREAM 12
13
FILE
(MOV001.MP4)
AUXILIARY
INFORMATION
dref
REFERENCE #1
TS FILE
(MOV001.M2T)
MPEG2
TRANSPORT
STREAM WITH
TIME STAMPS
TIME STAMP
V_TSP (TS PACKET
INCLUDING VIDEO)
192
Byte
TIME STAMP
A_TSP (TS PACKET
INCLUDING AUDIO)
192
Byte
TIME STAMP
V_TSP (TS PACKET
INCLUDING VIDEO)
MOVING PICTURE
DATA FOR
0.4-1 SECOND
(ONE CHUNK)

FIG.32

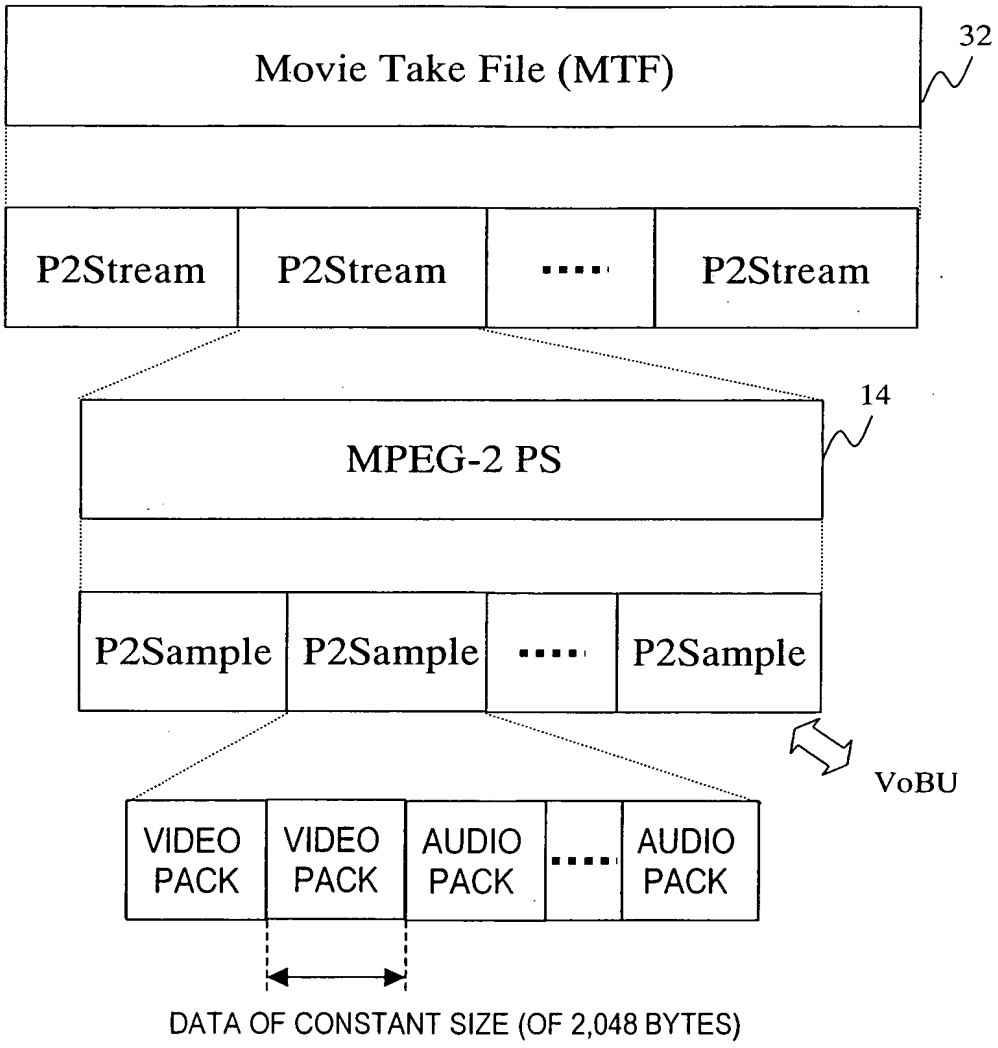

Movie Take File (MTF)
32
P2Stream
P2Stream
P2Stream
14
MPEG-2 PS
P2Sample
P2Sample
P2Sample
VoBU
VIDEO PACK
VIDEO PACK
AUDIO PACK
AUDIO PACK
DATA OF CONSTANT SIZE (OF 2,048 BYTES)

FIG.33

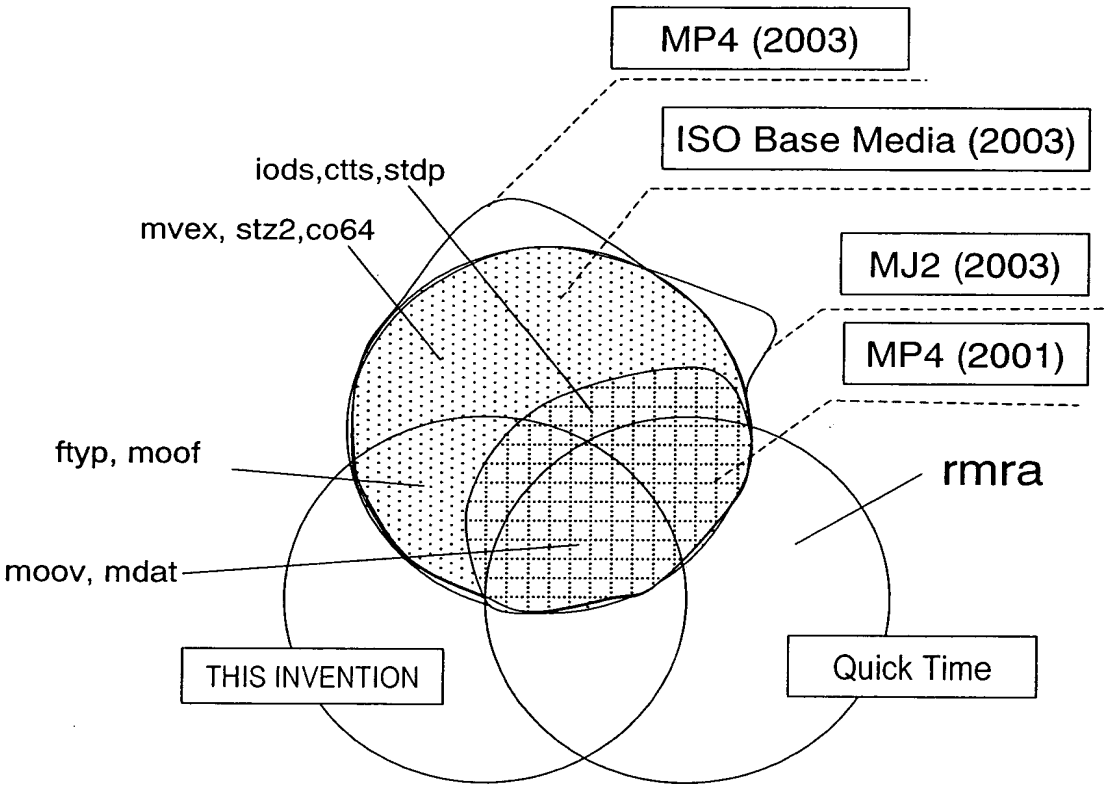
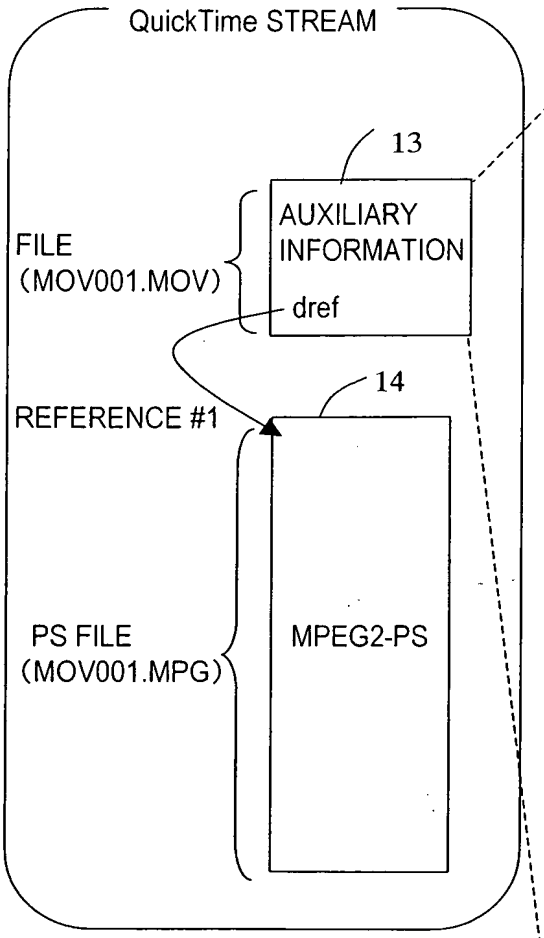

MP4 (2003)
ISO Base Media (2003)
iods,ctts,stdp
mvex, stz2,co64
MJ2 (2003)
MP4 (2001)
ftyp, moof
rmra
moov, mdat
THIS INVENTION
Quick Time

FIG.34



ATOM STRUCTURE	ATOM TYPE
Movie Atom	moov
Movie Header Atom	mvhd
Track Atom	trak
Track Header Atom	tkhd
Edit List Atom	edts
Edit List Atom	elst
Media Atom	mdia
Media Header Atom	mdhd
Handler Reference Atom	hdlr
Media Information Atom	minf
Base Media Header Atom	gmhd
Data Information Atom	dinf
Data Reference Atom	dref
Sample Table Atom	stbl
Decoding Time to Sample Atom	stts
Composition Time to Sample Atom	ctts
Sample Description Atom	stsd
Sample Size Atom	stsz
Sample to Chunk Atom	stsc
Chunk Offset Atom	stco
User Data Atom	udta
Reference Picture Size Atom	rfsz

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FIG.35

ATOM STRUCTURE	ATOM TYPE	
Movie Atom	moov	(Declaration of Movie Atom)
Movie Header Atom	mvhd	Store Writing Date and Time
Track Atom	trak	(Declaration of Track Atom)
Track Header Atom	tkhd	Store Track ID
Edit List Atom	edts	(Declaration of Edit List Atom)
Edit List Atom	elst	Specify Playback Range and Timings
Media Atom	mdia	(Declaration of Media Atom)
Media Header Atom	mdhd	Specify Time Information Unit
Handler Reference Atom	hdlr	Store component_subtype="m2ps" Showing Identity as MPEG2-PS
Media Information Atom	minf	(Declaration of Media Information Atom)
Base Media Header Atom	gmhd	Show Identity as Neither Video Frame nor Audio Frame
Data Information Atom	dinf	(Declaration of Data Information Atom)
Data Reference Atom	dref	Store Moving Picture Stream File in URL Form
Sample Table Atom	stbl	(Declaration of Sample Table Atom)
Decoding Time to Sample Atom	stts	Store Playback Duration of Each VOBU
Sample Description Atom	stsd	Show Identity as MPEG2-PS Including MPEG-2 Video and Also Show Specifications of PS Stream
Sample Size Atom	stsz	Store Size of Each VOBU
Sample to Chunk Atom	stsc	Store the Number of VOBUs to Make One Chunk When Overall MPEG File is Treated as One Chunk
Chunk Offset Atom	stco	Store Chunk Offset=0 as MPEG2-PS Starts from Beginning of MPEG File
User Data Atom	udta	(Declaration of User Data Atom)
Reference Picture Size Atom	rfsz	Store End Location of Top I-Frame of Each VOBU as Offset Value from Top of VOBU

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FIG.36

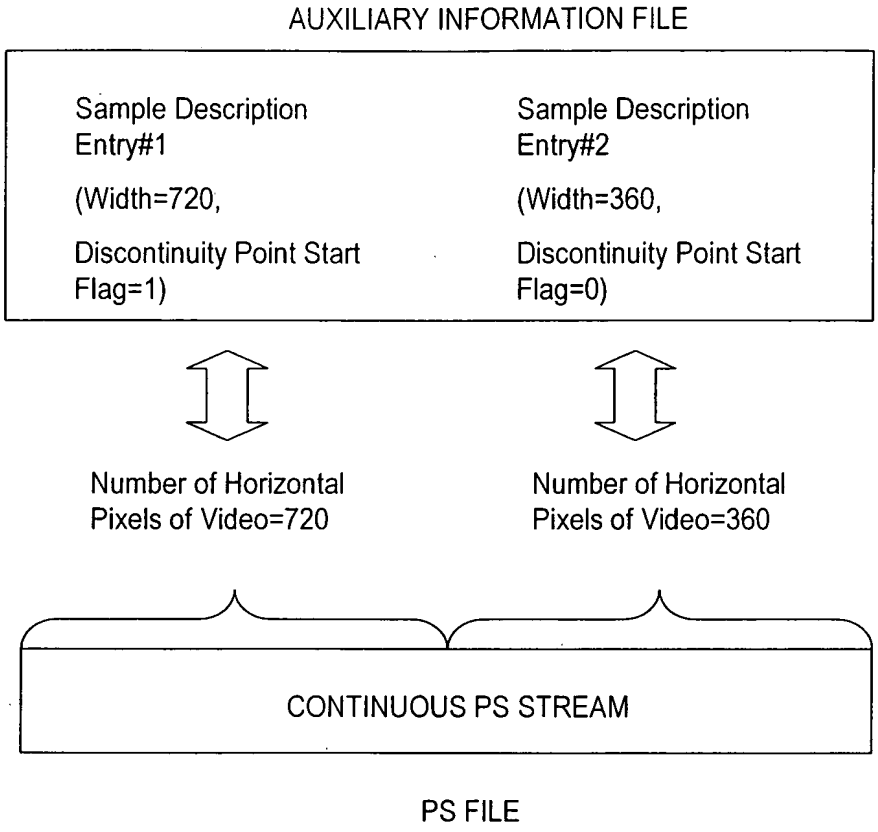

AUXILIARY INFORMATION FILE
Sample Description Entry#1
(Width=720,
Discontinuity Point Start Flag=1)
Sample Description Entry#2
(Width=360,
Discontinuity Point Start Flag=0)
Number of Horizontal Pixels of Video=720
Number of Horizontal Pixels of Video=360
CONTINUOUS PS STREAM
PS FILE

FIG.37

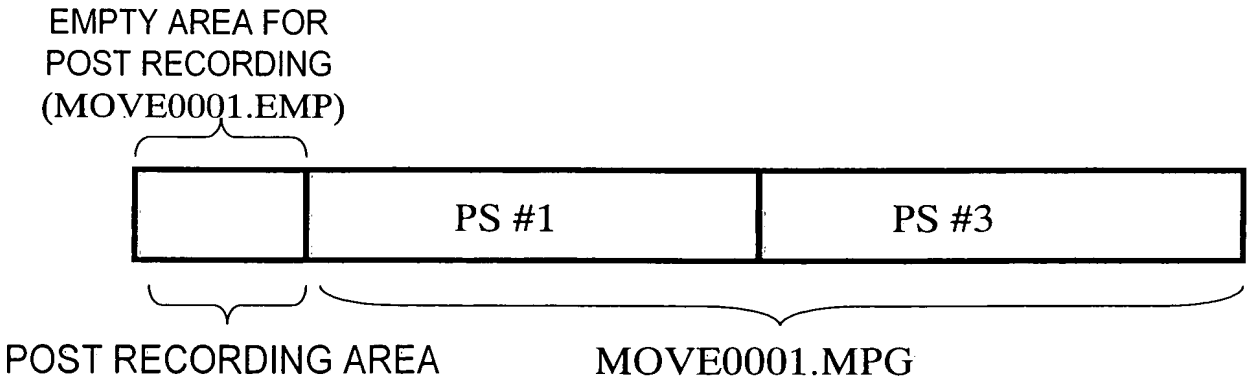

EMPTY AREA FOR POST RECORDING (MOVE0001.EMP)
PS #1
PS #3
POST RECORDING AREA
MOVE0001.MPG

FIG.38

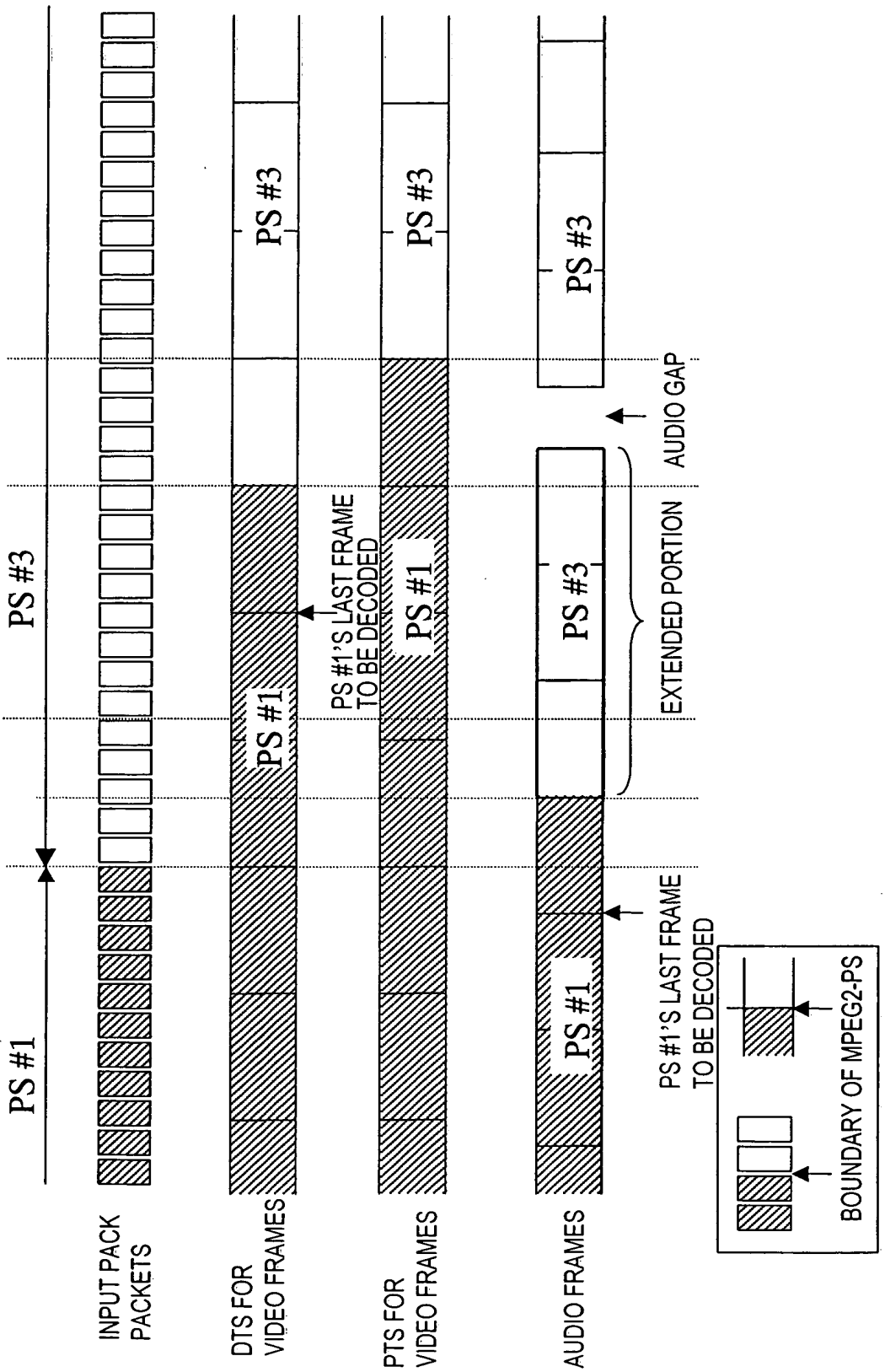

PS #1
PS #3
INPUT PACK PACKETS
DTS FOR VIDEO FRAMES
PS #1
PS #3
PS #1'S LAST FRAME TO BE DECODED
PTS FOR VIDEO FRAMES
PS #1
PS #3
AUDIO FRAMES
PS #1
PS #3
EXTENDED PORTION
AUDIO GAP
PS #1'S LAST FRAME TO BE DECODED
BOUNDARY OF MPEG2-PS

FIG.39

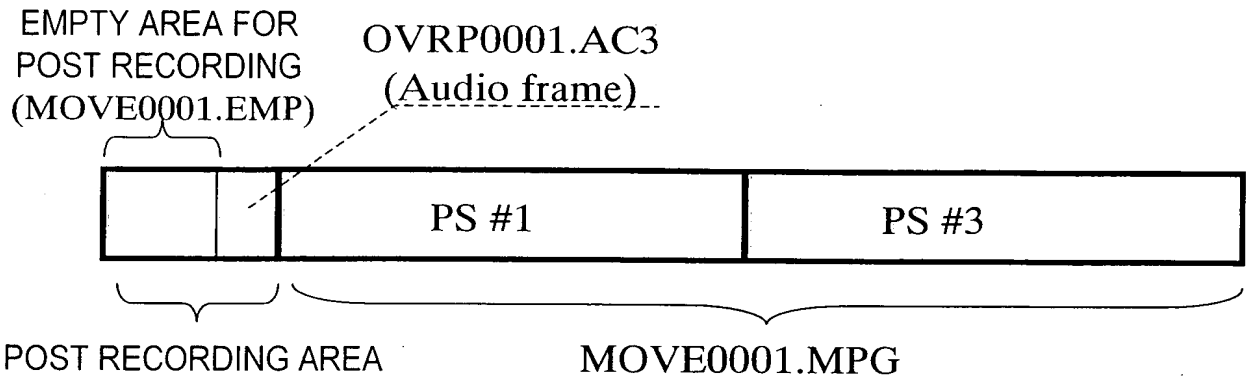

EMPTY AREA FOR
POST RECORDING
(MOVE0001.EMP)
OVRP0001.AC3
(Audio frame)
PS #1
PS #3
POST RECORDING AREA
MOVE0001.MPG

FIG.40

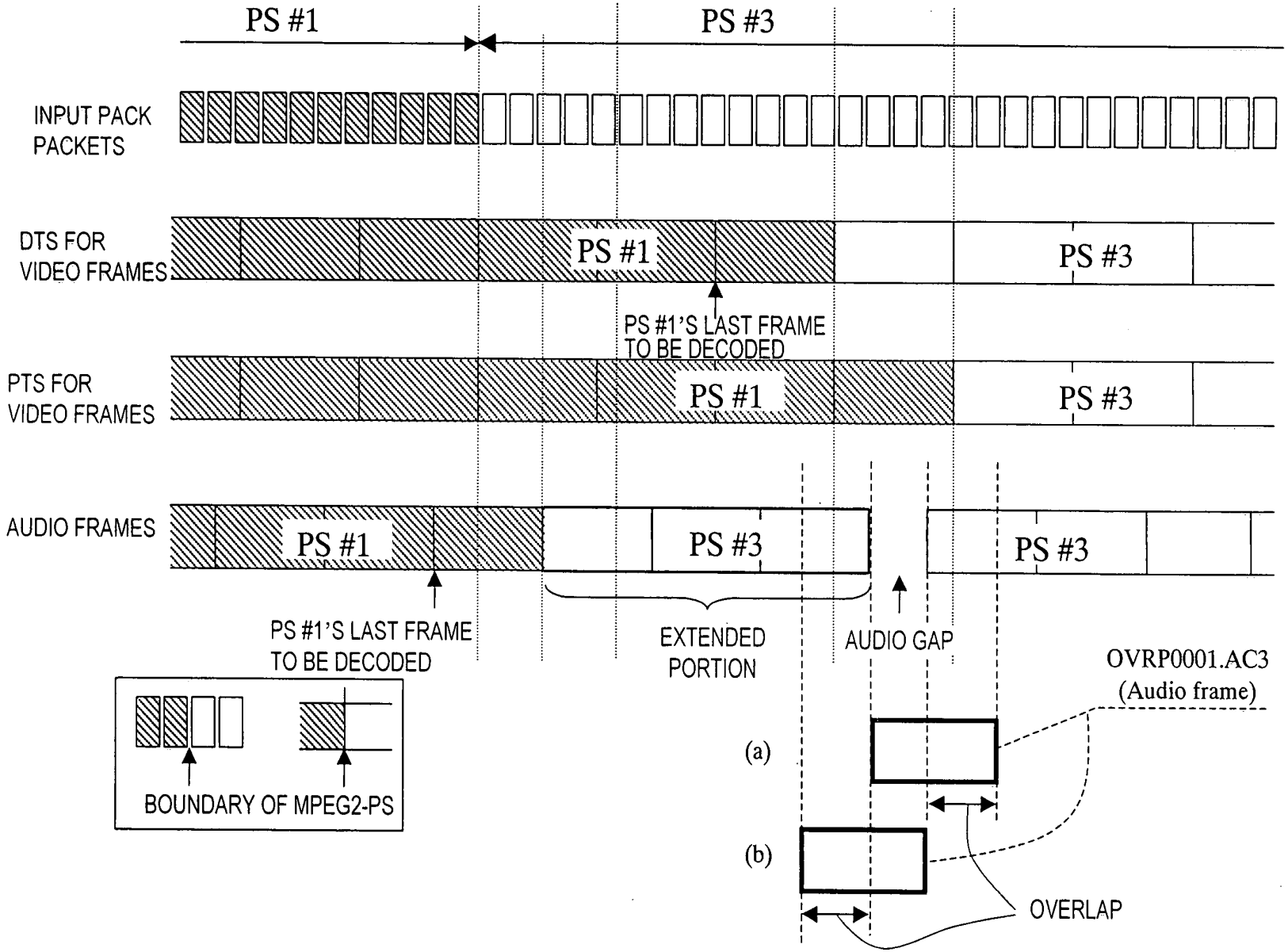

PS #1
PS #3
INPUT PACK PACKETS
DTS FOR VIDEO FRAMES
PS #1
PS #3
PS #1'S LAST FRAME TO BE DECODED
PTS FOR VIDEO FRAMES
PS #1
PS #3
AUDIO FRAMES
PS #1
PS #3
PS #3
PS #1'S LAST FRAME TO BE DECODED
EXTENDED PORTION
AUDIO GAP
OVRP0001.AC3 (Audio frame)
(a)
(b)
OVERLAP
BOUNDARY OF MPEG2-PS

FIG.41

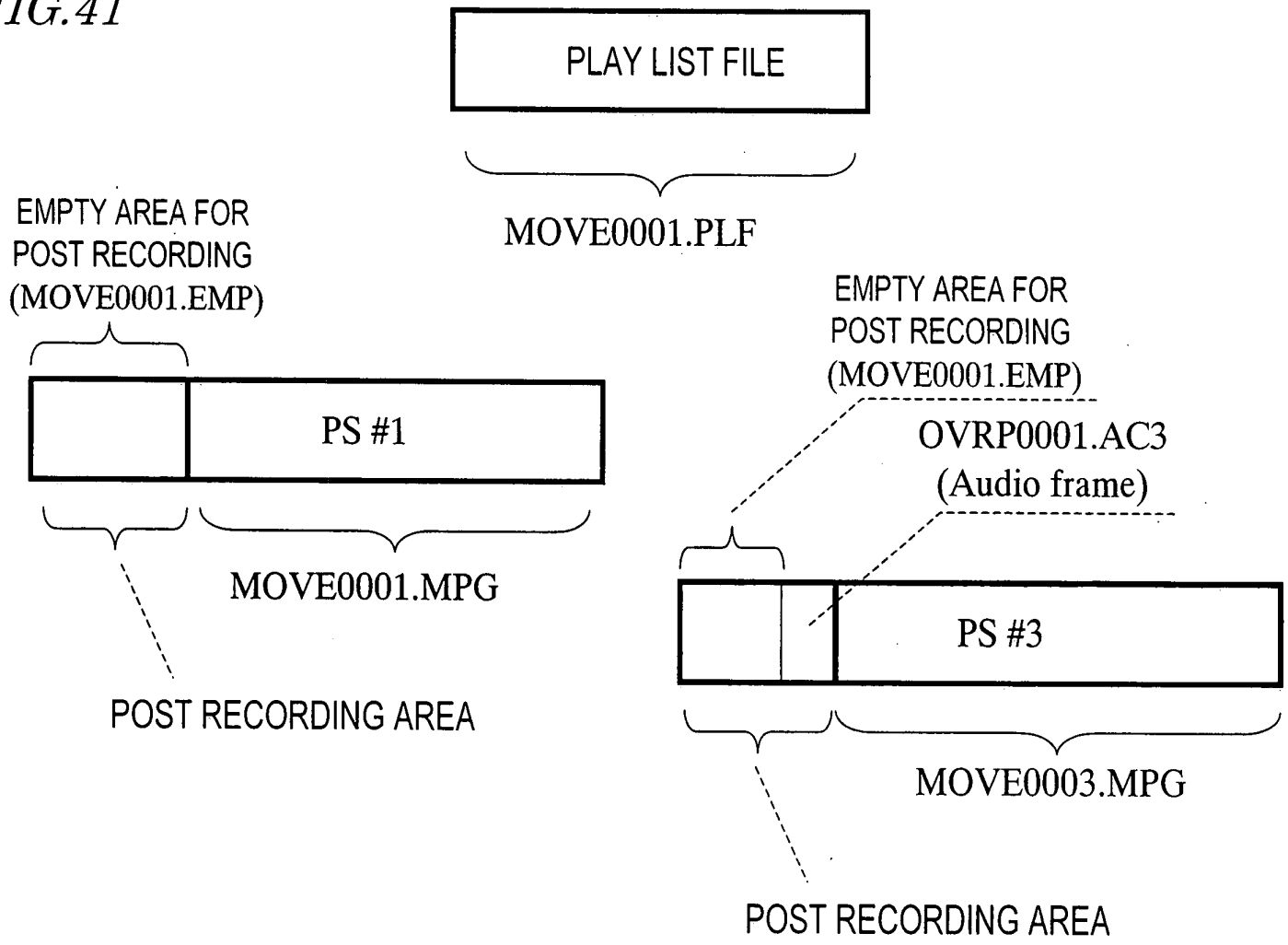

PLAY LIST FILE
MOVE0001.PLF
EMPTY AREA FOR POST RECORDING (MOVE0001.EMP)
PS #1
MOVE0001.MPG
POST RECORDING AREA
EMPTY AREA FOR POST RECORDING (MOVE0001.EMP)
OVRP0001.AC3 (Audio frame)
PS #3
MOVE0003.MPG
POST RECORDING AREA

FIG.42

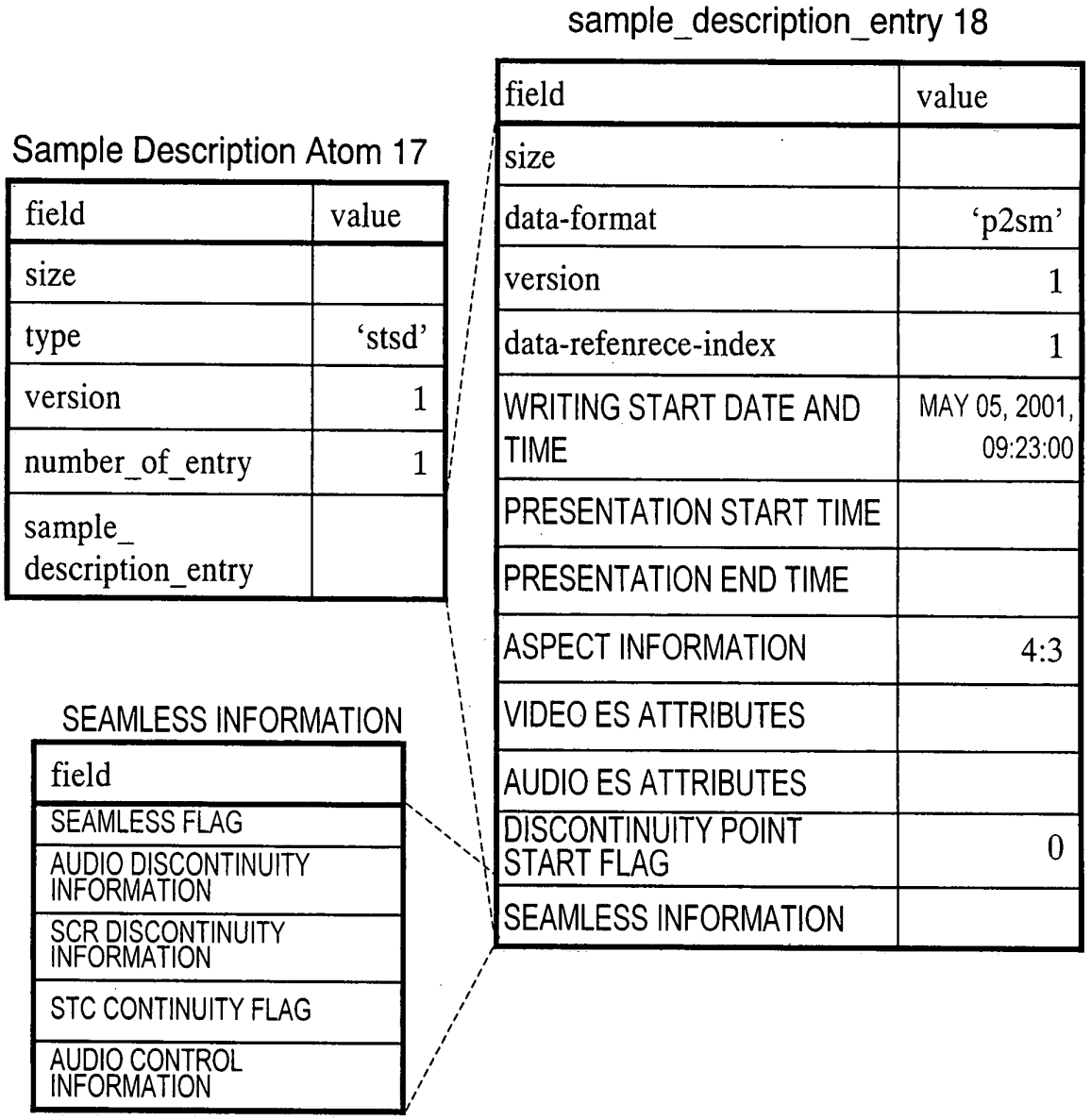

Sample Description Atom 17
field
value
size
type
'stsd'
version
1
number_of_entry
1
sample_ description_entry
sample_description_entry 18
field
value
size
data-format
'p2sm'
version
1
data-refenrece-index
1
WRITING START DATE AND TIME
MAY 05, 2001, 09:23:00
PRESENTATION START TIME
PRESENTATION END TIME
ASPECT INFORMATION
4:3
VIDEO ES ATTRIBUTES
AUDIO ES ATTRIBUTES
DISCONTINUITY POINT START FLAG
0
SEAMLESS INFORMATION
SEAMLESS INFORMATION
field
SEAMLESS FLAG
AUDIO DISCONTINUITY INFORMATION
SCR DISCONTINUITY INFORMATION
STC CONTINUITY FLAG
AUDIO CONTROL INFORMATION

FIG. 43

VALUE	MEANING
0	SEAMLESS CONDITIONS NOT SATISFIED
1	SEAMLESS CONDITIONS SATISFIED

field
WITH OR WITHOUT AUDIO GAP
AUDIO GAP START TIMING [STC VALUE]
AUDIO GAP INTERVAL [STC VALUE]

field
LAST SCR VALUE OF PREVIOUS PS
FIRST SCR VALUE OF NEXT PS

VALUE	MEANING
0	PREVIOUS AND NEXT PS HAVE DISCONTINUOUS STCS
1	PREVIOUS AND NEXT PS HAVE CONTINUOUS STCS

VALUE	MEANING
00	NEITHER FADES OUT NOR FADES IN
01	NOT FADES OUT BUT FADES IN
10	FADES OUT BUT NOT FADES IN
11	BOTH FADES OUT AND FADES IN

SEAMLESS INFORMATION

field
SEAMLESS FLAG
AUDIO DISCONTINUITY INFORMATION
SCR DISCONTINUITY INFORMATION
STC CONTINUITY FLAG
AUDIO CONTROL INFORMATION

FIG.44

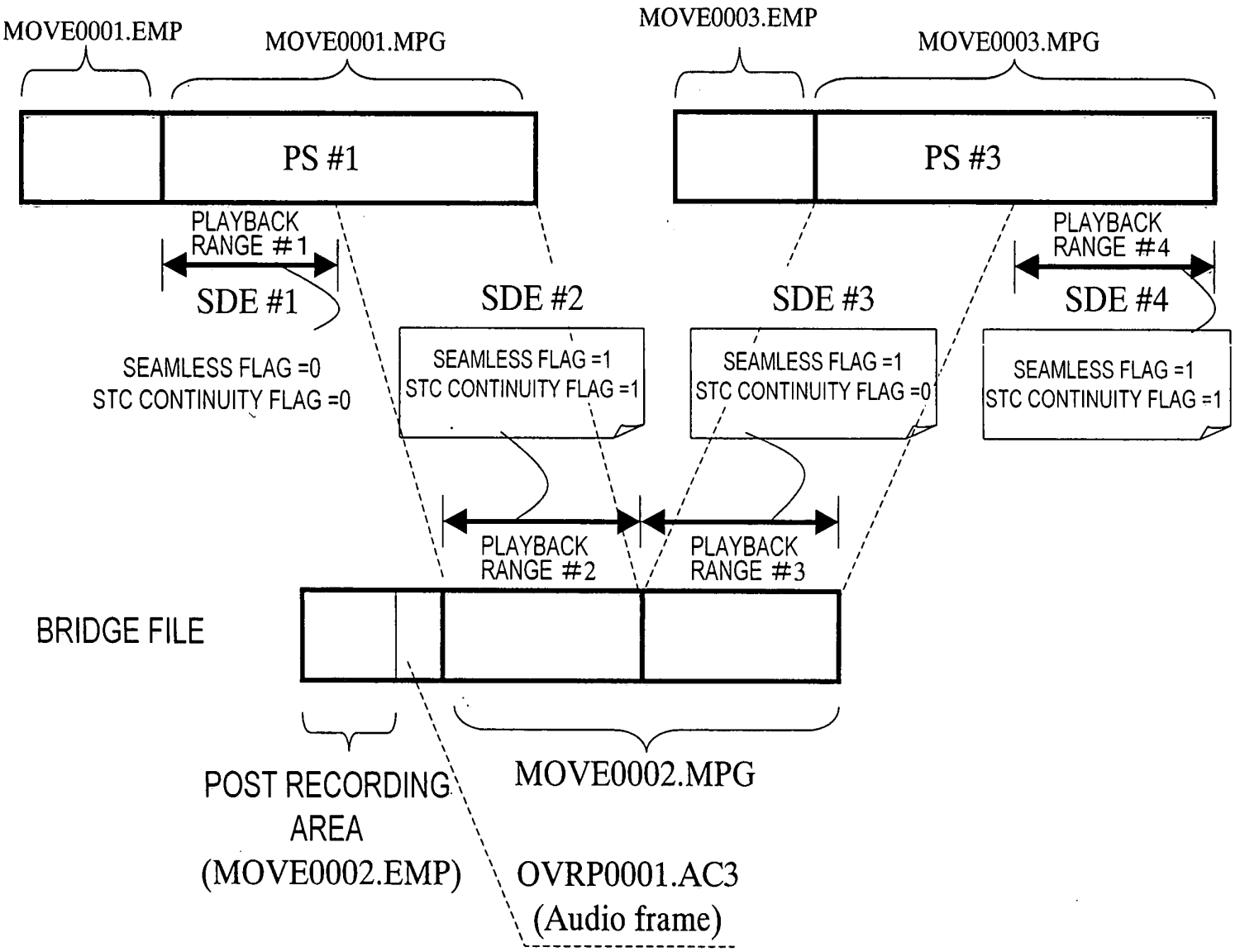
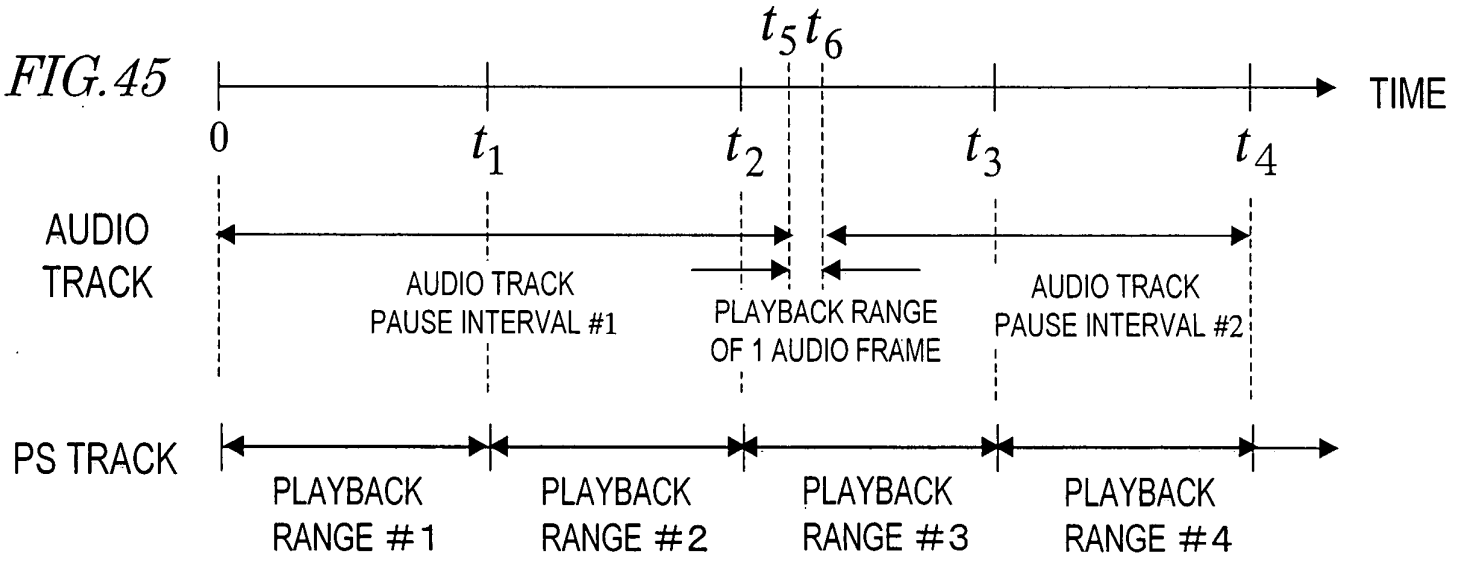

MOVE0001.EMP
MOVE0001.MPG
MOVE0003.EMP
MOVE0003.MPG
PS #1
PS #3
PLAYBACK RANGE #1
PLAYBACK RANGE #4
SDE #1
SDE #2
SDE #3
SDE #4
SEAMLESS FLAG =0
STC CONTINUITY FLAG =0
SEAMLESS FLAG =1
STC CONTINUITY FLAG =1
SEAMLESS FLAG =1
STC CONTINUITY FLAG =0
SEAMLESS FLAG =1
STC CONTINUITY FLAG =1
PLAYBACK RANGE #2
PLAYBACK RANGE #3
BRIDGE FILE
POST RECORDING AREA (MOVE0002.EMP)
MOVE0002.MPG
OVRP0001.AC3 (Audio frame)

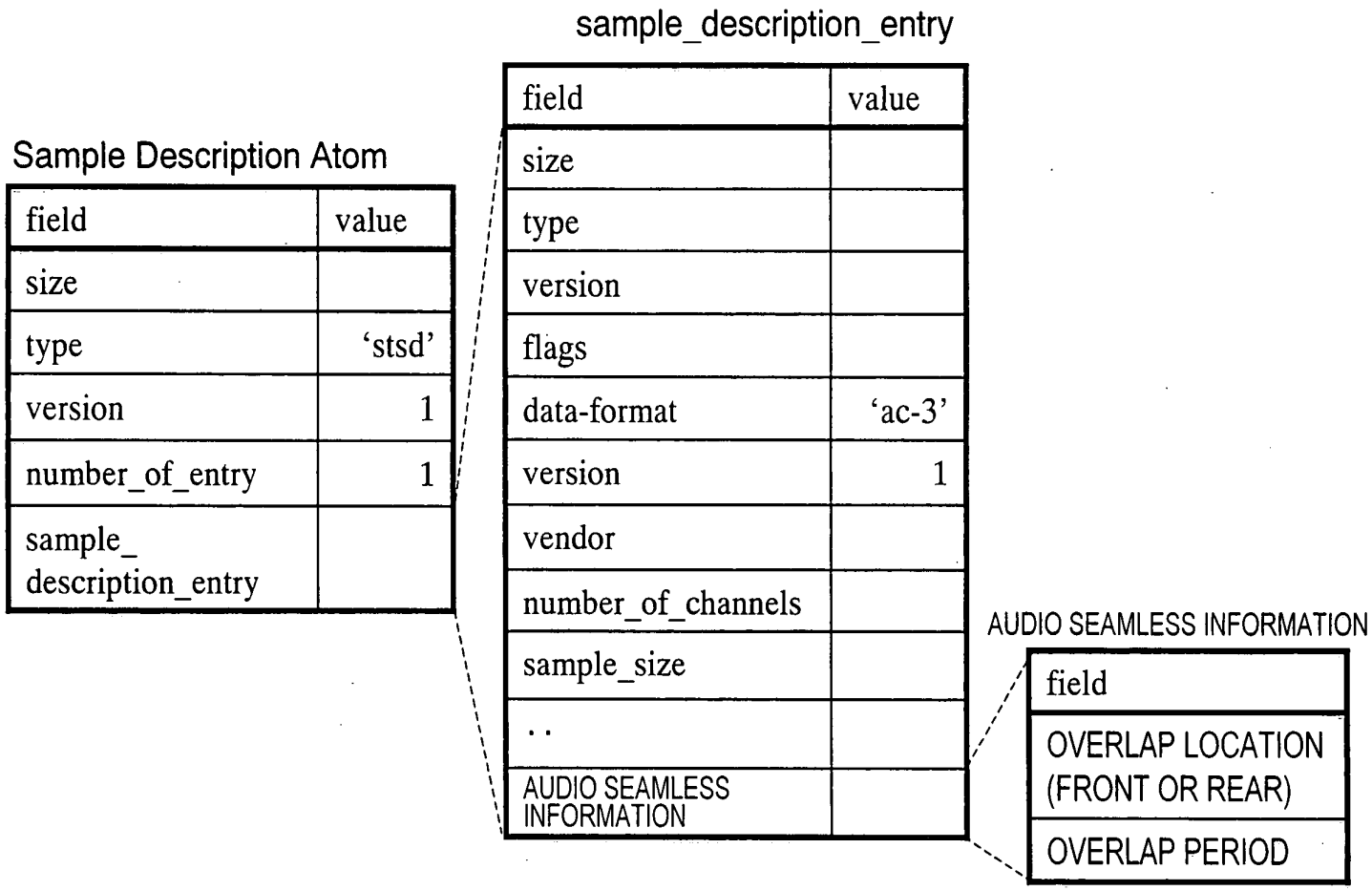
FIG.45



EDIT LIST TABLE FOR EDIT LIST ATOM OF PS TRACK		PLAYBACK RANGE #1	PLAYBACK RANGE #2	PLAYBACK RANGE #3	PLAYBACK RANGE #4
	track_duration	t1	t2-t1	t3-t2	t4-t3
	media_time	0	0	t2-t1	t3-t2
	media_rate	1.0	1.0	1.0	1.0

EDIT LIST TABLE FOR EDIT LIST ATOM OF AUDIO TRACK		PAUSE INTERVAL #1	PLAYBACK RANGE	PAUSE INTERVAL #2
	track_duration	t5	t6-t5	t4-t6
	media_time	-1	0	-1
	media_rate	1.0	1.0	1.0

FIG.46


sample_description_entry
Sample Description Atom
field
value
size
type
'stsd'
version
1
number_of_entry
1
sample_ description_entry
field
value
size
type
version
flags
data-format
'ac-3'
version
1
vendor
number_of_channels
sample_size
. .
AUDIO SEAMLESS INFORMATION
AUDIO SEAMLESS INFORMATION
field
OVERLAP LOCATION (FRONT OR REAR)
OVERLAP PERIOD